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GL20-2HC/GL20-2HC-5V
2-Channel High-Speed Counting Module
Equipment Guide

Industrial Automation | New Energy Vehicle | Intelligent Elevator | Intelligent Robot | Digital Energy | Rail Transit

Data code PS00021902A01

Legal Information

Copyright

Trademarks

Disclaimer of Liability

Due to continuous updates and improvements of products and technologies, the content of this documentation may not fully match the actual products. In the event of any discrepancies, the actual products shall prevail.

The contents are subject to change without notice due to product upgrade.

Waste Disposal

The storage, use, and disposal of this product (including optional accessories) must comply with local laws and regulations.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel can identify the risks of the product/system and prevent possible dangers.

Proper Use of the Product

Proper transportation, storage, assembly, installation, commissioning, operation, and maintenance are required to ensure the safe operation of the product without any problems. The required ambient conditions must be met. All operations must follow the guidelines provided in this documentation.

Preface

Introduction

This guide describes the product overview, model and nameplate specifications, component descriptions, terminal wiring, as well as technical and environmental specifications of the module.

Target audience

This guide is primarily intended for the following engineers:

- Inovance development/service engineers
- Channel/End-user chief technical engineers
- Channel/End-user mechanical engineers
- Channel/End-user electrical engineers
- Channel/End-user software engineers
- Channel/End-user maintenance/service engineers

Documentation guide

The product documentation package consists of an equipment guide and a system guide, enabling users to quickly access the information they need.

- Equipment guide: Provides a brief overview of module attributes, including model descriptions, component descriptions, technical specifications, and terminal wiring diagrams.
- System guide: Covers all typical application scenarios of the system, encompassing system introduction, installation, wiring, configuration and commissioning, troubleshooting, and maintenance.

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		Standards compliance
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

Certification	Directive		Standards compliance
KCC certification	-		-
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	Code	Description
GL20 Series Module System Guide	PS00022010	This guide covers all typical application scenarios of the system, providing detailed instructions on system configuration, installation, wiring, commissioning, troubleshooting.
GL20-2HC/GL20-2HC-5V 2-Channel High-Speed Counting Module Equipment Guide (this guide)	PS00021902	This guide describes the product overview, model and nameplate specifications, component descriptions, terminal wiring, as well as technical and environmental specifications of the module.

Revision history

Revision date	Version	Description of change(s)
April 2026	A01	• Added model and nameplate for GL20-2HC-5V in *" Model and Nameplate" on page 15*. • Added wiring diagram for GL20-2HC-5V in *"5.2 Wiring Diagram" on page 20*. • Added specifications for GL20-2HC-5V in *" Technical Specifications" on page 48*.
2025-12	A00	First release

Access to the guide

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

- Visit *https://www.inovance.com/global*, and choose Service> Support > Documentation Download.
- 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 the guide.

Warranty disclaimer

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

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

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

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

For details, see Product Warranty Card.

Table of Contents

1 Fundamental Safety Instructions

1.1 Industrial Information Security

The product provides interfaces for network connection and data transmission. To protect factories, systems, machines, and networks from cyber attacks, it is essential to implement proper protection mechanism for industrial security.

Customers are responsible for providing and maintaining a secure connection between the product and their network or any other network to protect their factories, systems, machines, and networks from unauthorized access. Such systems or machines can be connected to an enterprise network or the Internet only when a secure connection is established and appropriate security measures (such as using antivirus software or installing firewalls) are in place.

Inovance continuously develops and improves products and solutions to enhance safety. It is strongly recommended that you update the product promptly and always use the latest version.

Tampering with software (such as viruses, Trojans, and Worms) can lead to unsafe drivestate, which can put the device in an unsafe operation state. This may result in death,serious injury, and property damage. Observe the following strictly.

- Always use the latest software version. If the product version is no longersupported or the latest version of the program is not applied, customers are atincreased risk of cyber-attacks.
- Take proper protection measures (including but not limited to deploying antivirussoftware, firewall, WAF, IPS/IDS, situational awareness system, IDverification, and data encryption) to prevent files in the mobile storage devicefrom being damaged by malware and protect products, networks, systems, andinterfaces from unauthorized access, disturbance, intrusion, data disclosure, orinformation theft.
- Check all safety-related interfaces and settings after commissioning.

1.2 General 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. The "CAUTION", "WARNING", and "DANGER" are only supplements to the safety instructions.
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	The "DANGER" sign indicates that failure to comply with the notice will result in severe personal injuries or even death.
WARNING	The "WARNING" sign indicates that failure to comply with the notice may result in severe personal injuries or even death.
CAUTION	The "CAUTION" sign indicates that failure to comply with the notice may result in minor or moderate personal injury or equipment damage.

Unpacking
WARNING . Do not install the product in the case of any damage, rust, or signs of use on the product or accessories upon unpacking. . Do not install the product in the case of water seepage into the product or missing or damaged components upon unpacking. . Do not install the product in the case of any discrepancy between the product you received and the product name on the packing list.
CAUTION . Check whether the packing is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. . Unpack the package by following the unpacking sequence. Do not strike the package violently. . Check for damage, rust, or scratches on the surfaces of the product and accessories upon unpacking. . Check whether the package contents are consistent with the packing list after unpacking.

Storage and Transportation
WARNING . Large-scale or heavy equipment must be transported by qualified professionals using specialized hoisting equipment. Failure to comply may result in personal injury or equipment damage. . Before hoisting the equipment, ensure that components such as the front cover and terminal blocks are secured firmly with screws. Loosely-connected components may fall off and result in personal injury or equipment damage. . Never stand or stay below the product which is being hoisted. . Hoist the equipment at a constant speed with a steel rope to prevent any vibration or shock to the equipment. Never turn the equipment over or keep it suspended for a long time. Failure to comply may result in personal injury or equipment damage.
CAUTION . Handle the equipment with care and mind your steps during transportation to prevent personal injury or equipment damage. . When carrying the equipment with bare hands, hold the enclosure firmly with care to prevent parts from falling. Failure to comply may result in personal injury. . Store and transport the equipment based on the storage and transportation requirements. Failure to comply may result in equipment damage. . Do not store or transport the equipment in equipment exposed to splashing water or rain, direct sunlight, strong electric field, strong magnetic field, or strong vibration. . Do not store the equipment for more than three months. Long-term storage requires stricter protection and necessary inspections. . Pack the equipment securely and properly before transportation. Use a sealed container for long-distance transportation. . Do not transport the equipment with other devices or materials that may harm or have negative impacts on the equipment.

Design
DANGER • Design a safety circuit and add an error handling program in the software to ensure the product remains in a safe state upon external power failure or product faults. • Add an external safety device such as a fuse or circuit breaker because the equipment may smoke or burn due to long-time overcurrent caused by a rating error or short-circuited load.
WARNING • When an output unit such as a relay or transistor in the equipment is damaged, the output may become uncontrollable and remain ON or OFF for a long period. • The equipment design must comply with the overvoltage category requirements specified in the environmental specifications. The power supply must have a system-level lightning protection device, assuring that overvoltage due to lightning shock cannot be applied to the power supply input terminals, signal input terminals, or output terminals, to prevent equipment damage. • Make sure that proper measures have been taken to avoid malfunction caused by the communication faults between the equipment and related devices, preventing personal injury or equipment damage.
CAUTION Do not create, on the touch screen of the HMI, switches that may result in personal injury of the operator or equipment damage. Use independent switches for performing critical operations. Failure to comply may result in accidents caused by wrong outputs or faults.

Installation
DANGER The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.
WARNING • Read through the guide and safety instructions before installation. • Do not install this product in places with strong electric or magnetic field. • Before installation, ensure that the mechanical strength of the installation site can bear the weight of the equipment. Failure to comply will result in mechanical hazards. • Before installation, ensure that the installation environment meets the specifications. Failure to comply will result in product damage. • Do not wear loose clothes or accessories during installation. Failure to comply may result in an electric shock. • Before installing the equipment in an enclosed environment (such as a cabinet or case), use a cooling device (such as a fan or air conditioner) to cool the environment to the required temperature. Failure to comply may result in equipment over-temperature or a fire. • Do not retrofit the equipment. • Do not fiddle with the bolts used to fix equipment components or the bolts marked in red. • The equipment shall be installed in a cabinet or terminal device. Protection measures such as a fireproofing shell, electric protection shell, or mechanical protection shell must be provided for the cabinet or terminal device. The IP level must meet IEC standards and local laws and regulations. • Before installing devices with strong electromagnetic interference, such as a transformer, install a shielding device for the equipment to prevent malfunction. • Install the equipment onto an incombustible object such as a metal. Keep the equipment away from combustible objects. Failure to comply may result in a fire. • For any equipment not supporting hot swapping, disconnect all external power supplies of the system before installing/disassembling the equipment. Failure to comply may result in an electric shock or equipment fault or malfunction.

Installation

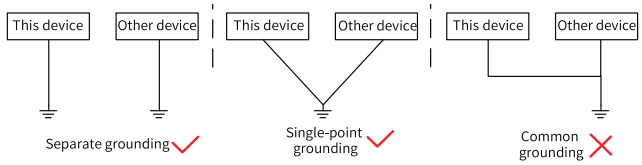
CAUTION

- Cover the top of the equipment with a piece of cloth or paper during installation. This is to prevent unwanted objects such as metal chippings, oil, and water from falling into the equipment and causing faults. After installation, remove the covering to prevent it from blocking the vent, which may affect the heat dissipation and cause the equipment to overheat.
- During installation, ensure the equipment is connected to the respective connector securely and hook the equipment firmly. Improper installation may result in malfunction, fault, or fall-off.

Wiring

DANGER

- The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed.
- Before wiring, switch off all the power supplies of the equipment. Wait for at least the time designated on the equipment warning label before further operations because residual voltage still exists after power-off. Measure the DC voltage of the main circuit and make sure that it is below the safety voltage. Failure to comply may result in an electric shock.
- Do not perform wiring, remove the equipment cover, or touch the PCB with power on. Failure to comply may result in electric shock.
- Make sure that the equipment is grounded properly. Failure to comply may result in an electric shock. Separate grounding or single-point grounding, other than common grounding, is recommended.



- 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 an electric shock or equipment damage.
- Install the terminal cover attached to the equipment before power-on or operation after wiring is done. Failure to comply may result in an electric shock.

WARNING

- Do not connect the power cable to output terminals of the equipment or product. Failure to comply may cause equipment damage or even a fire.
- Cables must meet size and shield requirements. The shield must be reliably grounded at one end.
- Fix the terminal screws with the tightening torque specified in the guide. Improper tightening torque may cause the connecting part over-temperature or damage, resulting in a fire.
- After wiring is done, check that all cables are connected properly and no screws, washers or exposed cables are left inside the equipment. Failure to comply may result in electric shock or equipment damage.

CAUTION

- Follow the proper electrostatic discharge (ESD) procedure and wear an anti-static wrist strap to perform wiring. Failure to comply may result in damage to the equipment or to the internal circuit of the product.
- Use shielded twisted pairs for the control circuit. Connect the shield to the grounding terminal of the equipment for grounding purpose. Failure to comply will result in equipment malfunction.

Power-on
DANGER • The equipment must be operated only by professionals with electrical knowledge. Non-professionals are not allowed. • Before power-on, check that the equipment is installed and wired properly. • Before power-on, make sure that the power supply meets equipment requirements to prevent equipment damage or even a fire. • Do not open the cabinet door or protective cover of the equipment, touch any terminal of the equipment, or remove any part of the equipment with power-on. Failure to comply may result in death or personal injury.
WARNING Perform a trial run after wiring to ensure that the equipment operates safely. Failure to comply may result in personal injury or equipment damage.

Operation
DANGER • The equipment must be operated only by professionals. Failure to comply can result in death or personal injury. • Do not touch any connecting terminals or disassemble any unit or component of the equipment during operation. Failure to comply may result in an electric shock.
WARNING • Do not touch the enclosure, fan, or resistor with bare hands. Failure to comply may result in burns. • Prevent metal or other objects from falling into the equipment during operation. Failure to comply may result in a fire or equipment damage. • During operation, do not bring live parts into contact with the metal enclosure of the product. Failure to comply may result in a fire or equipment damage.
CAUTION • Operate the equipment under the required environmental conditions. Failure to comply may result in equipment fault or damage. • Touch the HMI panel with hands only during operation. Inovance assumes no responsibility for panel damage caused by excessive external force.
Safety recommendations • In positions where the operator directly touches the mechanical parts, for example, where a mechanical device is loaded/unloaded, or where a machine runs automatically, manually-operated devices or other alternative means must be carefully designed so that they are independent of the equipment to start or stop the automatic operation of the system. • If you need to modify the program while the system is running, use the lock function or other protection measures to ensure that only authorized personnel can make the necessary modifications.

Battery Usage

- Do not use batteries that do not meet the equipment requirements. Failure to comply may result in death, personal injury, explosion, or a fire.
- Do not throw batteries into a fire or heat oven. Do not crush or cut batteries. Failure to comply may result in death, personal injury, explosion, or a fire.
- Do not expose batteries to extremely high temperatures. Failure to comply may result in death, personal injury, explosion, or a fire.
- Do not swallow batteries. Failure to comply may result in chemical burns.
- If a button battery is swallowed by accident, seek medical treatment immediately. Failure to comply may result in severe internal burns within two hours, which may cause death.

- Keep the batteries away from children.
- If the battery compartment is not shut tight, stop using the product and keep it away from children.

Maintenance

- Maintenance must be carried out by professionals who have received electrical trainings and have sufficient electrical knowledge.
- Do not maintain the equipment with power-on. Failure to comply may result in an electric shock.
- Before maintenance, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.
- Disconnect all external power supplies of the system before cleaning the equipment or re-tightening screws on the terminal block or screws for connector installation. Failure to comply may result in an electric shock.
- Disconnect all external power supplies of the system before removing the equipment or connecting/removing wiring. Failure to comply may result in an electric shock or malfunction.

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

Repair

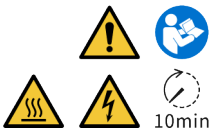
- Repair must be carried out by professionals who have received the electrical trainings and have sufficient electrical knowledge.
- Do not repair the equipment with power-on. Failure to comply may result in electric shock.
- Before inspection or repair, disconnect all the power supplies of the equipment and wait for at least the time specified on the warning label.

- Submit the repair request according to the warranty agreement.
- When the fuse is blown or the circuit breaker or earth leakage circuit breaker (ELCB) trips, wait as specified on the product warning sign before power-on or further operations. Failure to comply may result in personal injuries, equipment damage or even death.
- When the equipment is faulty or damaged, require professionals to perform troubleshooting and repair by following repair instructions and keep a repair record.
- Replace quick-wear parts of the product in accordance with the replacement instructions.
- Do not operate the damaged equipment. Failure to comply may result in death, personal injury, or severe equipment damage.
- Recheck the wiring and reset the parameters after equipment replacement.

Disposal
WARNING • Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in death, personal injury, or property damage. • Recycle retired equipment in accordance with industry waste disposal standards to avoid environmental pollution. • Treat the scrapped equipment as industrial waste. Dispose of the batteries according to local laws and regulations.

Safety Labels

To ensure safe operation, comply with safety labels on the equipment and do not damage or remove the labels. The following table describes the meaning of the safety labels.

Safety labels	Description
	• Before using the equipment, read the guide and safety precautions carefully. Failure to comply may result in personal injury, death, or equipment damage. • Do not touch the terminals or remove the cover with power-on or within 10 min after power-off. Failure to comply may result in an electric shock. • The surface of the product may become very hot during operation. Do not touch these hot areas, as this may cause burns!

2 Product Introduction

- GL20-2HC is a 2-channel high-speed counting module that supports 2-channel AB-phase differential input (with 1x/2x/4x frequency multiplication), single-ended AB-phase input, and single-phase pulse + direction input. It supports signal input up to 4 MHz (up to 500 kHz for the single-ended interface). Each channel of the module features two probe inputs, one comparison output, two DIs, and one DO.
- The GL20-2HC-5V is a 2-channel high-speed counting module that supports 2-channel A/B phase differential input (with 1x/2x/4x frequency multiplication), single-ended A/B phase input, and single-phase pulse + direction input. The input voltage is 5 VDC. It supports signal input up to 4 MHz (up to 500 kHz for the single-ended interface). Each channel of the module features two probe inputs, one comparison output, two DIs, and one DO.

3 Model and Nameplate

Model

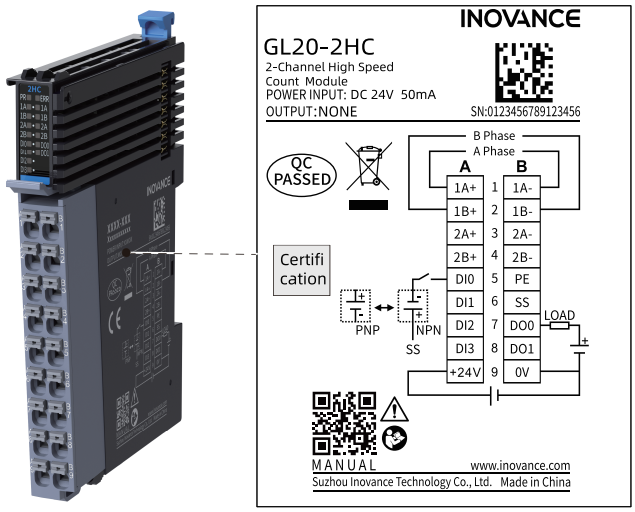
G L 20 – 2 HC – 5V

① ② ③ ④ ⑤ ⑥

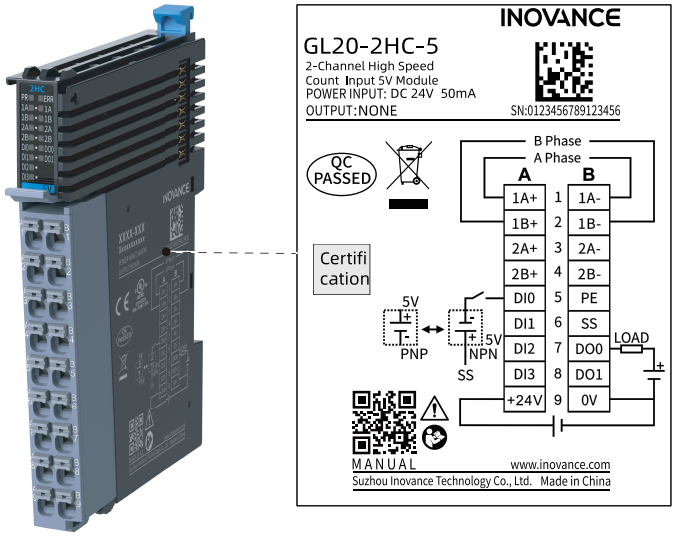
① **Product family** G: Controller general-purpose module	④ **Number of counting channels** 2: Two I/O channels
② **Product type** L: Local module	⑤ **Module type** HC: Phase A/B high-speed counting slave module
③ **Series** 20: 20 series module	⑥ **Input voltage class** 5V: 5 V input voltage

Nameplate

GL20-2HC



GL20-2HC-5V

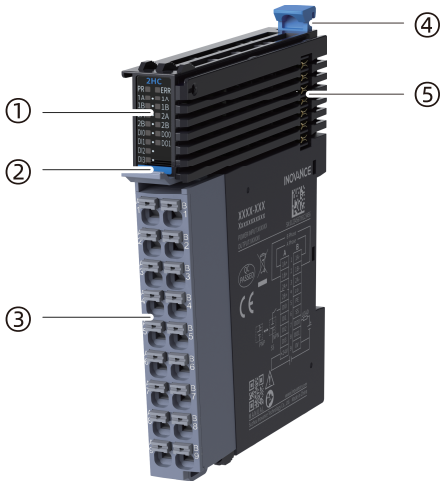


Based on the above description of model number and nameplate, the relevant ordering data of this product is described in the following table.

Model	Description	Product code	Applicable model
GL20-2HC-INT	GL20 series 2-channel high-speed counting module	01441073	Applicable to GL20 series communication interface modules, such as GL20-RTU-ECT32
GL20-2HC-5V	GL20 series 2-channel high-speed counting module with 5 V input	01441731	Applicable to GL20 series communication interface modules, such as GL20-RTU-ECT32

4 Components

The components of the GL20-2HC and GL20-2HC-5V modules are identical. The GL20-2HC module is used as an example below.



<table>
<tr><th>No.</th><th>Interface name</th><th colspan="4">Function</th></tr>
<tr><td rowspan="8">①</td><td rowspan="8">Signal indicator</td><td>PR (POWER +RUN)</td><td>Power/Operation indicator</td><td>Yellow-green</td><td>• Steady ON: The module is in normal operation.
• Fast flashing: The module is addressed successfully.
• Slow flashing: The module is powered on but not addressed.
• OFF: The module is not powered on or is faulty.</td></tr>
<tr><td>ERR</td><td>Fault indicator</td><td>Red</td><td>On when the module 24V power is lost or fails.</td></tr>
<tr><td>1A/1B/2A/2B (left)</td><td colspan="3">It is the 1A/1B/2A/2B differential signal input indicator. The indicator is steady on when the drive status is input; otherwise, the indicator is off.</td></tr>
<tr><td>DI0 to DI3 (left)</td><td colspan="3">It is the DI0 to DI3 input channel indicator. The indicator is steady on when the drive status is input; otherwise, the indicator is off.</td></tr>
<tr><td>1A/1B/2A/2B (right)</td><td colspan="3">It is the 1 A/1B/2 A/2B differential input disconnection indicator. The indicator is steady on when the disconnection signal is input; otherwise, the indicator is off. For details, see “5.1 Terminal Assignment” on page 19.
• The GL20-2HC module only supports the disconnection detection function of differential wiring and does not support the disconnection detection function of single-ended wiring
• The disconnection detection function can be disabled through the software. You can select whether to enable the disconnection detection function by setting 800nh:1 bit9. The function is disabled by default. If the disconnection detection function is enabled, you can determine the disconnection detection fault through the indicator (corresponding to the red indicator).</td></tr>
<tr><td>DO0 to DO1 (right)</td><td colspan="3">It is the DO0 to DO1 output channel indicator. The indicator is steady on when the drive status is input; otherwise, the indicator is off.</td></tr>
<tr><td rowspan="3">②</td><td rowspan="3">Color identification</td><td colspan="2">Red: Digital output</td><td colspan="2">Orange: Analog output</td></tr>
<tr><td colspan="2">Gray: Digital input</td><td colspan="2">Green: Analog input</td></tr>
<tr><td colspan="2">White: Communication</td><td colspan="2">Blue: Other modules</td></tr>
<tr><td>③</td><td>PUSH IN terminal</td><td colspan="4">Pluggable terminal block with spring clamp wiring. The terminal block features "AB" silkscreen marking. For detailed definitions, see “5.1 Terminal Assignment” on page 19</td></tr>
<tr><td>④</td><td>Rail mounting latch</td><td colspan="4">Used to secure the module to the DIN rail.</td></tr>
<tr><td>⑤</td><td>Three-position terminal block</td><td colspan="4">Used for backplane bus power supply and communication.</td></tr>
</table>

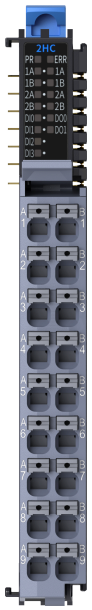
Note

- Fast flashing: The indicator is on for 200 ms and off for 200 ms, cycling continuously.
- Slow flashing: The indicator is on for 200 ms and off for 1 s, cycling continuously.

5 Terminal Wiring

5.1 Terminal Assignment

The terminals of the GL20-2HC and GL20-2HC-5V modules are identical. The GL20-2HC module is used as an example below.



Description	Signal (left)	Terminal (left)	Terminal (right)	Signal (right)	Description
Differential signal A+ of counter 1	1A+	A1	B1	1A-	Differential signal A- of counter 1
Differential signal B+ of counter 1	1B+	A2	B2	1B-	Differential signal B- of counter 1
Differential signal A+ of counter 2	2A+	A3	B3	2A-	Differential signal A- of counter 2
Differential signal B+ of counter 2	2B+	A4	B4	2B-	Differential signal B- of counter 2
Digital input channel 0	DI0	A5	B5	G	Counter differential signal shield
Digital input channel 1	DI1	A6	B6	SS	Digital input common terminal
Digital input channel 2	DI2	A7	B7	DO0	Digital output channel 0
Digital input channel 3	DI3	A8	B8	DO1	Digital output channel 1
24 V power supply input (+)	24 V	A9	B9	0 V	24 V power supply input (-)

The GL20-2HC module has two high-speed counting channels, each with different counting, DI and DO terminals, as shown in the following table.

Counting channel	Differential input terminal	Single-ended input terminal	DI	DO
GH0	1A+, 1A-, 1B+, and 1B-	DI0 and DI1	DI0 and DI1	DO0
GH1	2A+, 2A-, 2B+, and 2B-	DI2 and DI3	DI2 and DI3	DO1

The GL20-2HC module has four DIs and two DOs, whose physical numbers are DI0, DI1, DI2, DI3, DO0, and DO1. Logical numbers are used in software function descriptions. The relationship between physical numbers and logical numbers is shown in the following table.

Channel	Physical number	Logical number
CH0	DI0	DI0
	DI1	DI1
	DO0	DO0
CH1	DI2	DI0
	DI3	DI1
	DO1	DO0

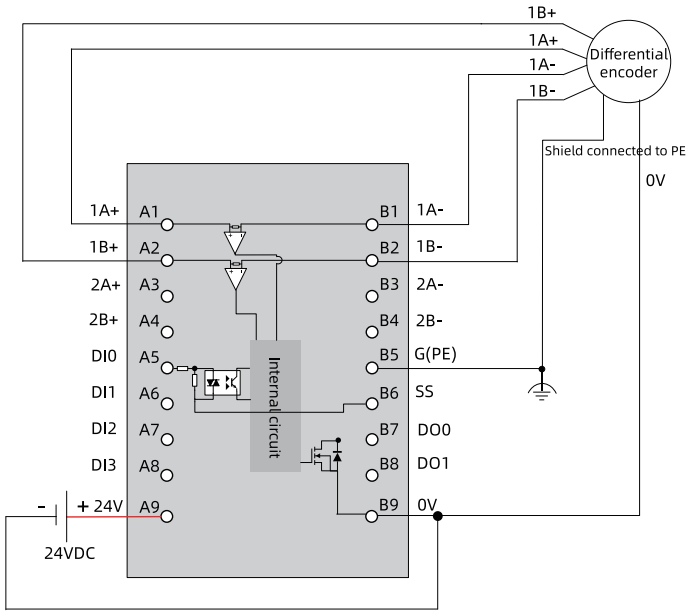
5.2 Wiring Diagram

Wiring precautions

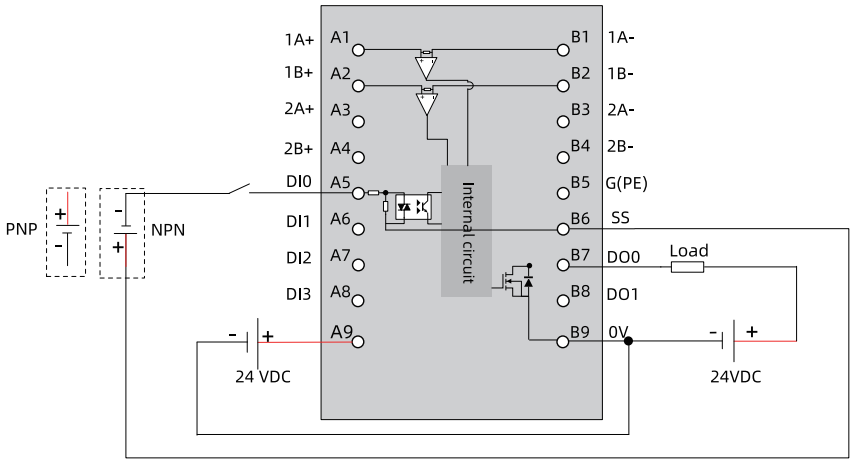
- Do not bundle the extension cables with power cables (high voltage and high current) that produce strong interference signals, as this may increase noise, surges, and induction effects. Separate the extension cables from the power cables and avoid cabling in parallel.
- Use the recommended cables and adapter boards for connection. It is recommended that shielded cables be used as extension cables to enhance anti-interference capacity.
- Apply single-point grounding for the shield of shielded cables and soldered cables.

Circuit wiring diagram

- The following figure shows the electrical wiring of the differential encoder that outputs 422 level.



The following figure shows the digital input and output electrical wiring.

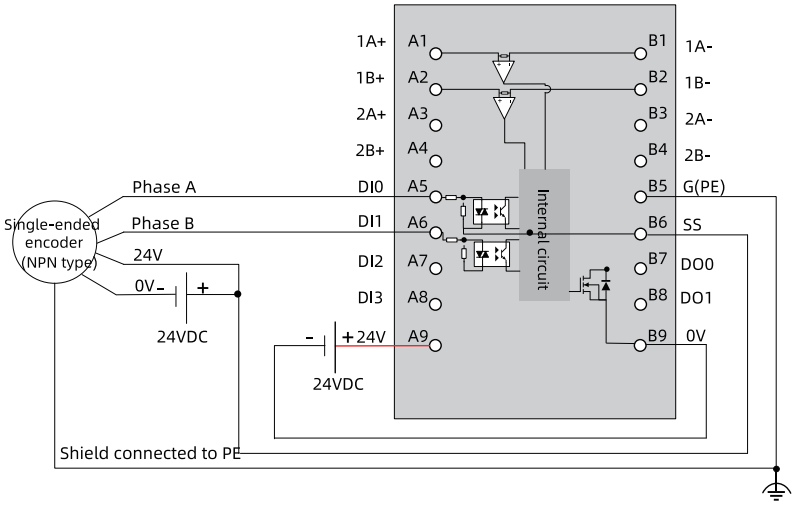


Note

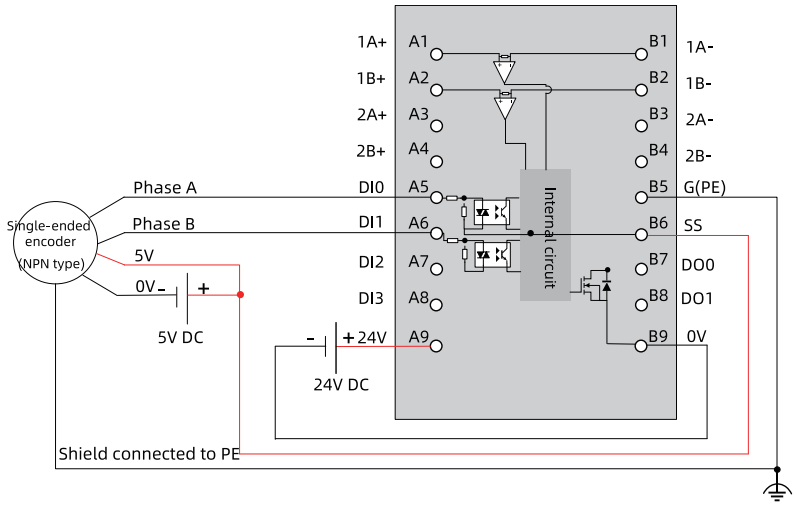
- The GL20-2HC module supports connecting up to two differential encoders. 1A and 1B serve as a group, and 2A and 2B serve as another. (The diagram shows 1A and 1B as an example. Connect 2A and 2B as one group in the same way.)
- The GL20-2HC module supports connecting up to four digital inputs (DI): DI0, DI1, DI2, and DI3. (The diagram shows DI0 as an example. Connect DI1, DI2, and DI3 in the same way.)
- The GL20-2HC module supports connecting up to two DOs: DO0 and DO1. (The diagram shows DO0 as an example. Connect DO1 in the same way.)
- Use either differential connection or single-ended connection for the GL20-2HC module.
- Connect the shield to the PE terminal.

- The following figure shows the electrical wiring diagram of the single-ended encoder with the collector output transistor NPN type.

  - **GL20-2HC**



  - **GL20-2HC-5V**

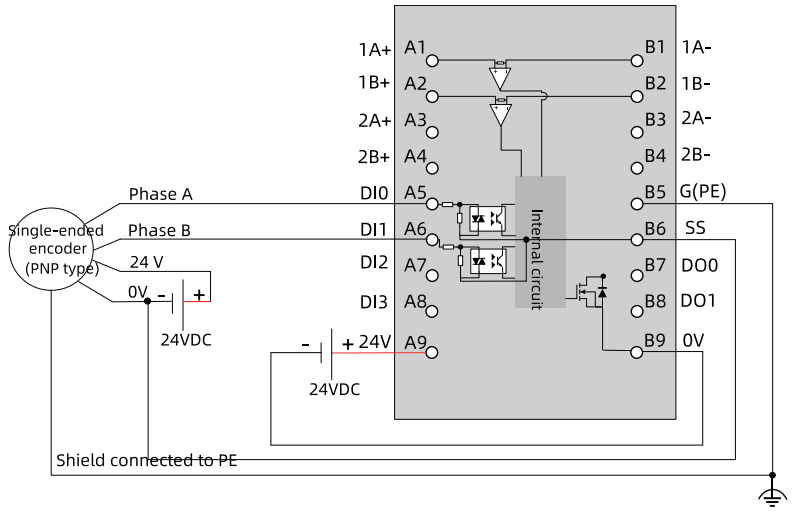


Note

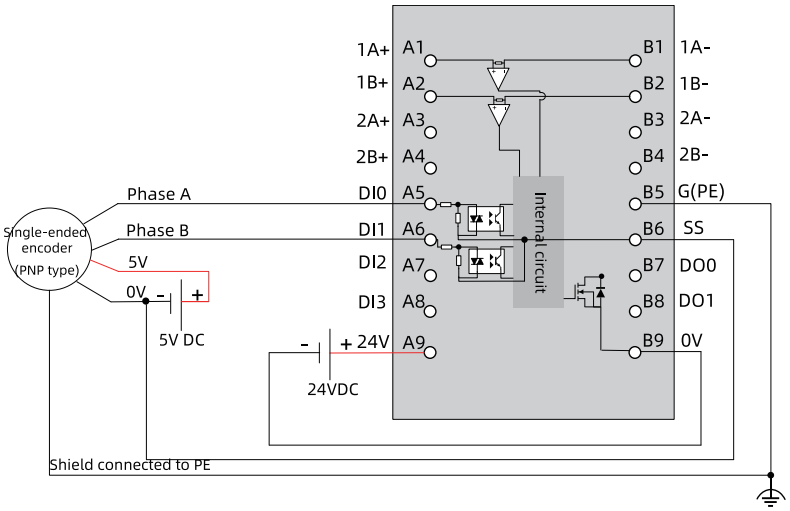
- The GL20-2HC module supports connecting up to two single-ended encoders: DI0 and DI1 serve as one group, and DI2 and DI3 serve as another. (The diagram shows DI0 and DI1 as an example. Connect DI2 and DI3 as one group in the same way.)
- The common terminal SS of the GL20-2HC module is connected to 24 V power supply.
- The GL20-2HC module supports connecting up to two DOs: DO0 and DO1. (The diagram shows DO0 as an example. Connect DO1 in the same way.)
- Use either differential connection or single-ended connection for the GL20-2HC module.

- The following figure shows the electrical wiring diagram of the single-ended encoder with the collector output transistor PNP type.

  - **GL20-2HC**



  - **GL20-2HC-5V**



Note

- The GL20-2HC module supports connecting up to two single-ended encoders: DI0 and DI1 serve as one group, and DI2 and DI3 serve as another. (The diagram shows DI0 and DI1 as an example. Connect DI2 and DI3 as one group in the same way.)
- The common terminal SS of the GL20-2HC module is connected to 0 V power supply.
- The GL20-2HC module supports connecting up to two DOs: DO0 and DO1. (The diagram shows DO0 as an example. Connect DO1 in the same way.)
- Use either differential connection or single-ended connection for the GL20-2HC module.
- Connect the shield to the PE terminal.

Caution

- The inrush current of each channel connected to a lamp load must be less than the rated current when connected to a resistive load.
- [1] Arcing and large back EMF can be generated between contacts upon stop of inductive load. Therefore, the lower the power, the greater the arc energy under the same curent consumption. In this case, install an arc extinguishing device.
- For inductive loads:
  - When the circuit is DC, add a freewheeling diode. When the forward current of the flywheel diode exceeds the load current, the maximum repetitive reverse voltage is 5 to 10 times higher than the load voltage.
  - When the circuit is AC, add an RC absorption circuit, where R is 100 Ω to 200 Ω and C is about 0.1 μF.

6 Function Description

6.1 Overview

If the GL20-2HC module is configured with the GL20-RTU-ECT32 communication interface module, up to four GL20-2HC modules are supported. The four GL20-2HC modules can be installed only in the first four slots in the configuration.

When the GL20-2HC module is used with the GL20-RTU-ECT32 communication interface module, data can be accessed through the object dictionary. The function description takes the first expansion slot of the communication interface module as an example. The second, third and fourth slots are defined in the same way as the first slot. The object dictionary is offset by 0x40 according to the definition of the communication interface module. The object dictionary of each slot is defined as follows.

Slot	Configuration parameter	PDO input parameter	PDO output parameter	Diagnostic parameter
1	800nh	600nh	700nh	A000h
2	804nh	604nh	704nh	A040h
3	808nh	608nh	708nh	A080h
4	80Cnh	60Cnh	70Cnh	A0C0h

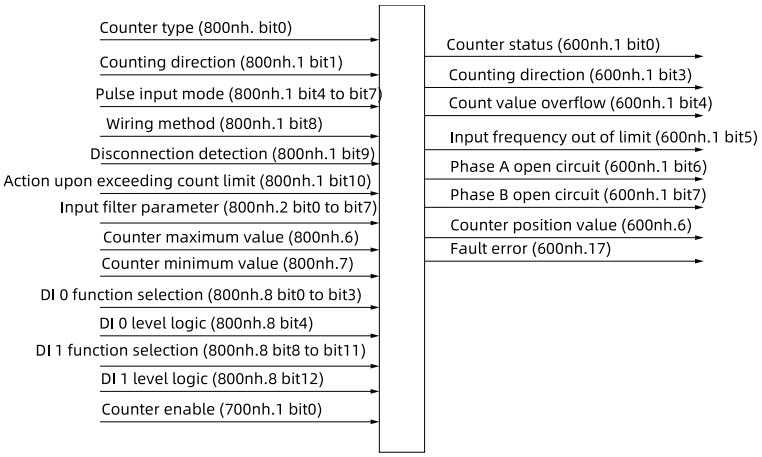
The letter n (range: 0 and 1) in the object dictionary represents the counting channel. For example, when the module is installed in the first slot, the object dictionary is defined as 800nh, 600nh, and 700nh. For channel 0, the object dictionary is defined as 8000h, 6000h, and 7000h. For channel 1, the object dictionary is defined as 8001h, 6001h, and 7001h.

6.2 Counter Function

The module supports two counters to enable differential pulse or single-ended pulse counting input from phase A port and phase B port. If single-ended signal input is used, the corresponding DI must be configured with the counting mode. Otherwise, the function cannot be used. Set the parameters and feedback information according to the following table.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Parameter description

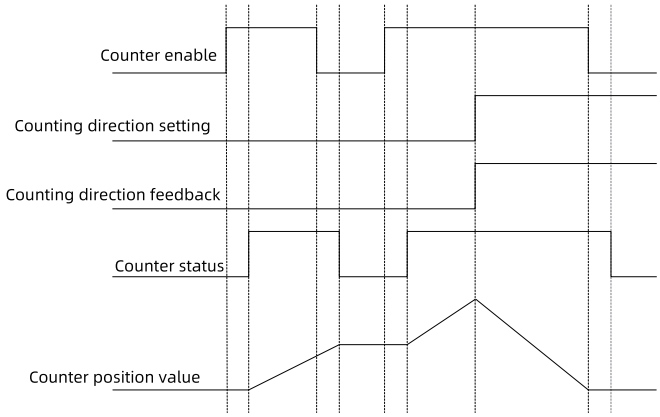
Name	Parameter	Value range	Default value	Description
Counter type	800nh.bit0	0: Linear 1: Ring	0	Each channel supports a 32-bit counting range, which can be changed by setting the maximum and minimum values. Linear: The counting function ranges from the maximum value to the minimum value. If the maximum or minimum value is reached, operations can be performed according to the setting for the scenario when the maximum or minimum value is exceeded. Annual type: The counting function ranges from the maximum value to the minimum value. When the count-up exceeds the maximum, the value jumps to the minimum. When the count-down exceeds the minimum, the value jumps to the maximum.
Counting direction	800nh.1 bit1	0: Phase A leads Phase B (forward) 1: Phase B leads Phase A (reverse)	0	This parameter sets the counting direction.

Name	Parameter	Value range	Default value	Description
Pulse input mode	800nh.1 bit4 to bit7	0: Phase A/B 1x frequency 1: Phase A/B 2x frequency 2: Phase A/B 4x Frequency 3: Pulse + Direction 4: CW/CCW 5: Single-phase counting (A) 6: Single-phase counting (B)	0	This parameter sets the input mode based on the actual counter input signal. • Phase A/B: An incremental encoder that supports phase A/B signal can be connected. The phase difference between phase A signal and phase B signal must be 90°. • Pulse + direction: An incremental encoder that supports pulse and direction signals can be connected. • CW/CCW: An incremental encoder that supports CW/CCW signals can be connected. • Single-phase A: A pulse encoder without direction signal can be connected. • Single-phase B: A pulse encoder without direction signal can be connected.
Wiring method	800nh.1 bit8	0: Differential wiring 1: Single-ended wiring	0	Select the wiring method according to actual conditions by referring to *"5.2 Wiring Diagram" on page 20*.
Disconnection detection	800nh.1 bit9	0: Disable 1: Enable	0	This function only supports detection of differential interface disconnection.
Action upon exceeding count limit	800nh.1 bit10	0: Stop counting 1: Continue counting	0	This parameter is related to the configuration of the parameter "Counter type". • Linear mode: If "Stop counting" is selected, the counter stops and triggers an overflow alarm upon reaching the maximum or minimum count value; the counter must be re-enabled to resume counting. If "Continue counting" is selected, the forward count value jumps to the minimum when exceeding the maximum, and the reverse count value jumps to the maximum when falling below the minimum. • Ring mode: Invalid parameter
Input filter parameter	800nh.2 bit0 to bit7	1: 50 ns; 2: 100 ns; 3: 200 ns; 4: 500 ns; 5: 1 μs; 6: 2 μs; 7: 5 μs; 8: 10 μs; 9: 20 μs; 10: 50 μs; 11: 100 μs; 12: 200 μs; 13: 500 μs; 14: 1 ms; 15: 2 ms; 16: 5 ms; 17: 10 ms; 18: 20 ms; 19: 50 ms; 20: 100 ms	2	Used to effectively suppress interference between phase A and phase B of the counter input. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.

Name	Parameter	Value range	Default value	Description
Counter maximum value	800nh.6	-2147483647 to +2147483647	2147483647	The maximum value of the counter can limit the counting range. You must enter a value larger than the minimum value of the counter.
Counter minimum value	800nh.7	-2147483648 to +2147483646	-2147483648	The minimum value of the counter can limit the counting range. You must enter a value smaller than the maximum value of the counter.
DI function selection	800nh.8 bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	This parameter is related to the parameter "Wiring method". Single-ended wiring: The corresponding DI must be configured with the counting function. Otherwise, the counter cannot work. Differential wiring: Invalid parameter
DI level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter is related to the parameter "Wiring method". Single-ended wiring: This parameter defines the level logic of the DI signal. Differential wiring: Invalid parameter
Counter enable	700nh.1 bit0	0: Invalid 1: Valid	-	When the signal is active and no other error occurs, the counter is enabled.
Counter status	600nh.1 bit0	0: Invalid 1: Valid	-	The counter status is active when the counter is enabled and no other error occurs.
Counting direction	600nh.1 bit3	0: Invalid 1: Valid	-	This parameter sets the counting direction.
Count value overflow	600nh.1 bit4	0: Invalid 1: Valid	-	This parameter is related to the configuration of the parameter "Counter type". Linear type: Valid when the maximum or minimum value is exceeded. Ring mode: Invalid parameter
Input frequency out of limit	600nh.1 bit5	0: Invalid 1: Valid	-	This parameter is related to the configuration of the parameter "Counter type". Differential wiring: Active when the input frequency is higher than 4 MHz. Single-ended wiring: Active when the input frequency is higher than 500 kHz.
Phase A open circuit	600nh.1 bit6	0: Invalid 1: Valid	-	Phase A disconnection detection is active when disconnection detection is enabled and phase A of the differential interface is wired improperly.
Phase B open circuit	600nh.1 bit7	0: Invalid 1: Valid	-	Phase B disconnection detection is active when disconnection detection is enabled and phase B of the differential interface is wired improperly.

Name	Parameter	Value range	Default value	Description
Counter position value	600nh.bit6	-2147483648 to +2147483647	-	This parameter sets the counter position value.
Fault code	600nh. bit17	0	-	This parameter specifies the fault code returned when the counting channel is abnormal. For details, see “ *Fault Diagnosis” on page 54*.

Sequence diagram

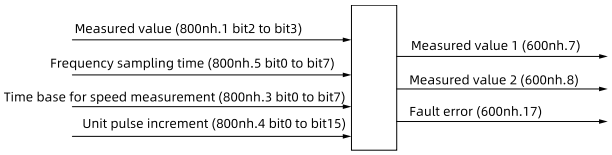


6.3 Signal Measurement

The module measures the phase A and phase B pulse frequency, cycle, and speed of each counter channel. Configure parameters related to the signal measurement function according to the following description.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Parameter description

Name	Parameter	Value range	Default value	Description
Measured value	800nh.1 bit2 to bit3	0: Not measured 1: Frequency 2: Cycle 3: Speed	0	The maximum frequency of the external input signal is affected by the wiring method (see *"5.2 Wiring Diagram" on page 20*). When the differential interface is used, the maximum input frequency is 4 MHz. When the single-ended interface is used, the maximum input frequency is 500 kHz. • Not measured: The signal measurement function and other related configuration parameters are invalid. • Frequency: Frequency of the counter input signal in the unit of Hz • Cycle: Cycle of the counter input signal in the unit of ms • Speed: Speed of the counter input signal. The unit depends on the time base of the speed measurement.
Frequency sampling time	800nh.5 bit0 to bit7	3: 500 μs; 4: 1 ms; 5: 2 ms; 6: 5 ms; 7: 10 ms; 8: 20 ms; 9: 50 ms; 10: 100 ms; 11: 200 ms; 12: 500 ms; 13: 1s; 14: 2s; 15: 5s; 16: 10s; 17: 20s; 18: 25s	10	The sampling time selected must meet the condition that the cycle of the input signal is smaller than the sampling time. The larger the parameter, the more stable and accurate the measured value. • Not measured: This parameter is invalid. • Frequency, cycle, and speed: The signal frequency is used to measure the cycle and speed. This parameter is strongly related to the frequency calculation. Count the number of input pulse signals within the set time and calculate the signal frequency. Select appropriate values when using the parameter. The sampling time must meet the condition that the input signal cycle is smaller than the sampling time. The larger the parameter, the more accurate the measured value.
Time base for speed measurement	800nh.3 bit0 to bit7	1: ms 2: 10 ms 3: 100 ms 4: 1s 5: 60s	2	This parameter is related to the parameter "Measured value". • Speed: This parameter determines the unit of speed, which is r/min by default. • Not measured, frequency, and cycle: This parameter is invalid.

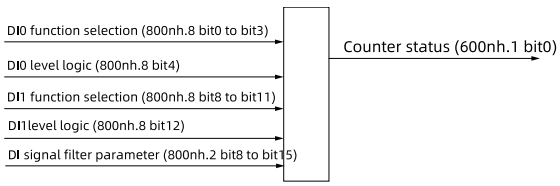
Name	Parameter	Value range	Default value	Description
Unit pulse increment	800nh.4 bit0 to bit15	0 to 65535	10	This parameter is related to the parameter "Measured value". • Speed: Number of pulses output per revolution. • Not measured, frequency, and cycle: This parameter is invalid.
Measured value 1	600nh.7	Frequency: 0 Hz to 16000000 Hz Cycle: 0 ms to 25000 ms Speed: Determined by the time base for speed measurement, unit pulse increment, and external input signal.	-	Measured value 1: Integer part of the measured value. Measured value = Measured value 1 + Measured value 2/10^8.
Measured value 2	600nh.8	Frequency: 0 Hz to 16000000 Hz Cycle: 0 ms to 25000 ms Speed: Determined by the time base for speed measurement, unit pulse increment, and external input signal.	-	Measure value 2: Decimal part of the measured value. The value is the rounded actual value multiplied by 10^8. Pay attention to the unit. Measured value = Measured value 1 + Measured value 2/10^8.
Fault code	600nh.17	0	-	This parameter specifies the fault code returned when the measurement function is abnormal. For details, see "Fault Diagnosis" on page 54.

6.4 Gating Function

The module measures the phase A and phase B pulse frequency, cycle, and speed of each counter channel. Configure parameters related to the gating function according to the following description. When the parameters are set correctly, the counter enabling signal (see "Parameter description" in "6.2 Counter Function" on page 24) and gating signal are all active, the counter is enabled. For details, see the parameters in the following table.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.

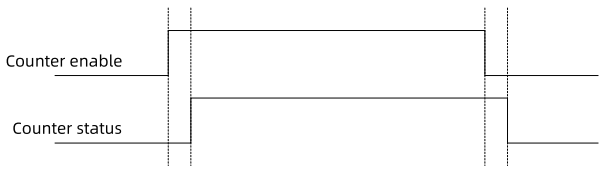


Parameter description

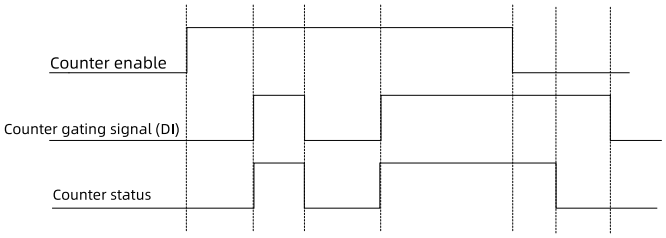
Name	Parameter	Value range	Default value	Description
DI Function Selection	800nh.8bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	When the DI is set to the gating function, the gating function is enabled.
DI level logic	800nh.8bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DI signal.
DI signal filter parameter	800nh.2bit8 to bit15	0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7	This parameter is used to suppress input interference. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. Two different filter types are set for DI signals. You can select a filter type based on actual conditions. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.
Counter status	600nh.1bit0	0: Invalid 1: Valid	-	The counter status is active when the counter is enabled, the gating signal is active, and no other error occurs. When multiple DIs are configured with the gating function, the counter can be started only when the gating signals of multiple terminals are active simultaneously.

Sequence diagram

The following figure shows the counter enabling sequence when the gating function is not used.



The following figure shows the counter enabling sequence when the gating function is used.

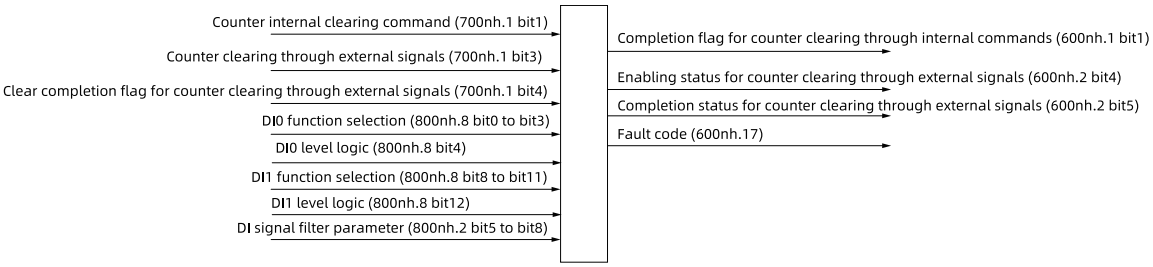


6.5 Clearing Function

Each counter supports the clearing function. You can clear the counter through internal commands or external DI signals. If you select external DI signals to clear the counter, configure at least one DI to be the clearing mode. Configure parameters related to the clearing function according to the following description. With the parameters set correctly, when the trigger signal is input through the DI or there is an internal trigger command, the position value of the counter is reset to 0. For details, see the parameter description in the following table.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Note

- The internal clearing command has higher priority than the external clearing command. When both internal and external clearing commands are enabled, only the internal clearing command is valid.
- The clearing function has higher priority than the preset function.

Parameter description

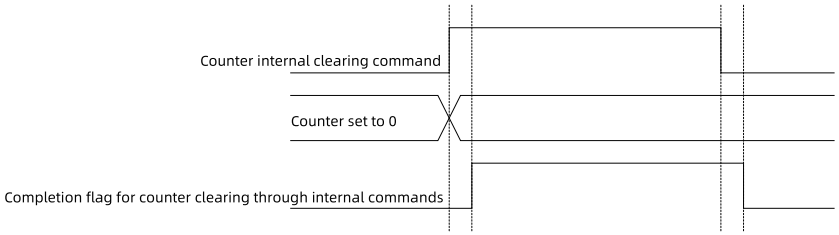
Name	Parameter	Value range	Default value	Description
Counter internal clearing command	700nh.1 bit1	0: Invalid 1: Valid	-	When the signal is active, the counter is cleared.
Counter clearing through external signals	700nh.1 bit3	0: Invalid 1: Valid	-	The counter is cleared through external signals when the signal is active and no other error occurs. This function is disabled when the counter is cleared through internal commands.

Name	Parameter	Value range	Default value	Description
Clear completion flag for counter clearing through external signals	700nh.1 bit4	0: Invalid 1: Valid	-	This function is used to clear the completion flag for counter clearing through external signals. If the completion flag is not cleared after being triggered, the next clearing action will not be executed.
DI function selection	800nh.8 bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	When you need to clear the counter through external signals, configure at least one DI with the clearing function. Otherwise, the function cannot work and an error will occur.
DI level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DI signal.
DI signal filter parameter	800nh.2 bit8 to bit15	0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7	This parameter is used to suppress input interference. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. Two different filter types are set for DI signals. You can select a filter type based on actual conditions. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.
Completion flag for counter clearing through internal commands	600nh.1 bit11	0: Invalid 1: Valid	-	When the internal clearing command is valid and no other error occurs, this parameter is active. When the internal clearing command is invalid, the completion flag for counter clearing through internal commands is cleared automatically.
Enabling status for counter clearing through external signals	600nh.2 bit4	0: Invalid 1: Valid	-	When the internal clearing command of the counter is invalid, counter clearing through external signals is enabled, and no other error occurs, this parameter is active.

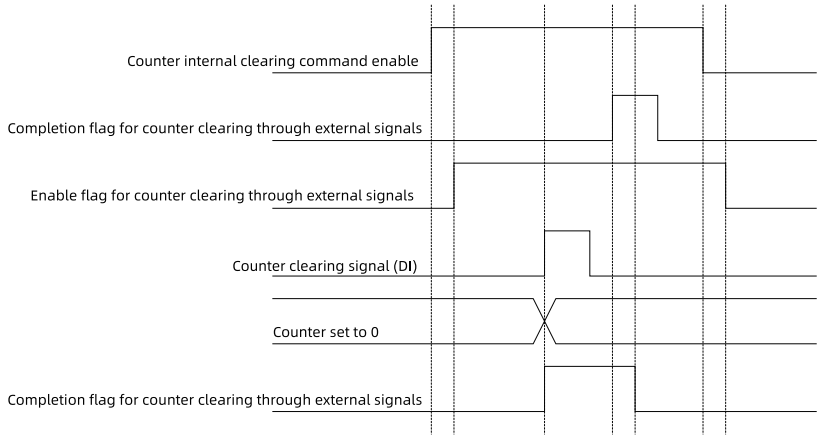
Name	Parameter	Value range	Default value	Description
Completion flag for counter clearing through external signals	600nh.2 bit5	0: Invalid 1: Valid	-	When external counter clearing is enabled and an active signal is present on the DI, the completion flag for counter clearing through external signals must be cleared. Otherwise, the next clearing action will not be executed.
Fault code	600nh.bit17	0	-	This parameter specifies the fault code returned when the clearing function is abnormal. For details, see *" Fault Diagnosis" on page 54*.

Sequence diagram

The time sequence diagram of counter clearing through internal commands is as follows.



The time sequence diagram of counter clearing through external signals is as follows.

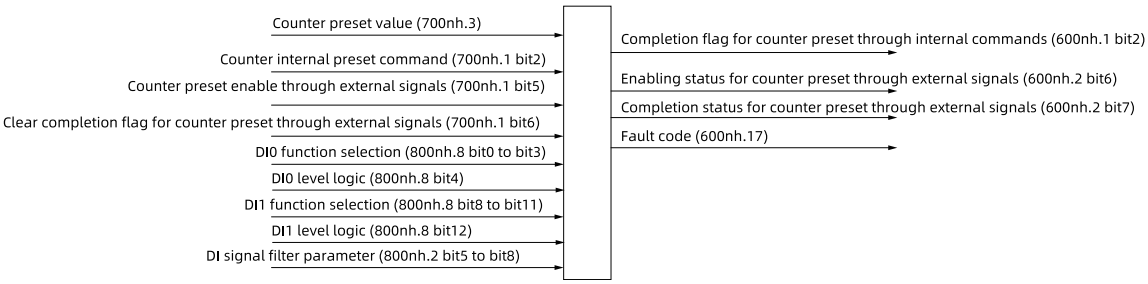


6.6 Preset Function

Each counter supports a preset function, which can be triggered via internal commands or external DI signals. If the external preset function is used, at least one DI must be configured in preset mode. When using this function, configure the parameters and feedback information as described below. Each parameter is set individually. After the parameters are set correctly, the counter position value is reset to the preset value upon a DI input trigger signal or an internal trigger command. For specific definitions, see the parameter descriptions in the table below.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Note

- The internal preset command has higher priority than the external preset command. When both internal and external preset commands are enabled, only the internal preset command is valid.
- The clearing function has higher priority than the preset function.

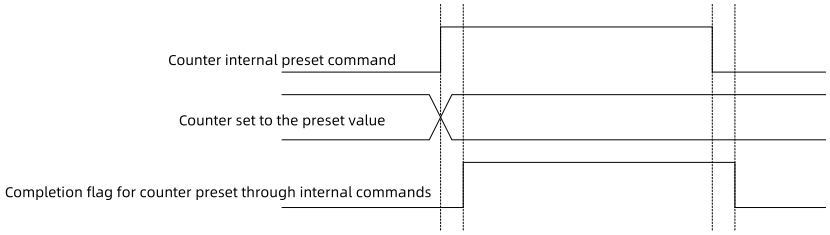
Parameter description

Name	Parameter	Value range	Default value	Description
Counter preset value	700nh.3	-2147483648 to +2147483647	-	The preset value must be between the maximum value and the minimum value.
Counter internal preset command	700nh.1 bit2	0: Invalid 1: Valid	-	When the signal is active, the counter is preset.
Counter preset enable through external signals	700nh.1 bit5	0: Invalid 1: Valid	-	The counter is preset through external signals when the signal is active and no other error occurs. This function is disabled when the counter is preset through internal commands.
Clear completion flag for counter preset through external signals	700nh.1 bit6	0: Invalid 1: Valid	-	This parameter is used to clear the flag for completion of counter preset through external signals. If the completion flag is not cleared after triggering, the next preset action will not be executed.
DI function selection	800nh.8 bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	When you need to preset the counter through external signals, configure at least one DI with the preset function. Otherwise, the function cannot work and an error will occur.
DI level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DI signal.

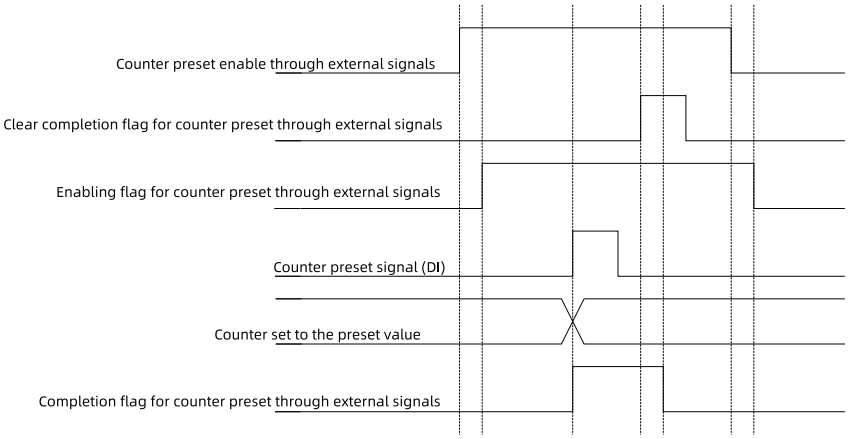
Name	Parameter	Value range	Default value	Description
DI signal filter parameter	800nh.2bit8 to bit15	0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7	This parameter is used to suppress input interference. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. Two different filter types are set for DI signals. You can select a filter type based on actual conditions. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.
Completion flag for counter preset through internal commands	600nh.1 bit11	0: Invalid 1: Valid	-	This parameter is active when the internal preset command of the counter is valid and no other error occurs. When the internal preset command is invalid, the completion flag for counter preset through internal commands is cleared automatically.
Enabling status for counter preset through external signals	600nh.2 bit4	0: Invalid 1: Valid	-	When the internal preset command of the counter is invalid, counter preset through external signals is enabled, and no other error occurs, this parameter is active.
Completion flag for counter preset through external signals	600nh.2 bit5	0: Invalid 1: Valid	-	When counter preset through external signals is enabled the DI inputs active signals, clear the completion flag for counter preset through external signals. Otherwise, the next preset action will not be executed.
Fault code	600nh. bit17	0	-	This parameter specifies the error code returned when the preset function is abnormal. For details, see “ *Fault Diagnosis*” *on page 54*.

Sequence diagram

The time sequence diagram of counter preset through internal commands is as follows.



The time sequence diagram of counter preset through external signals is as follows.

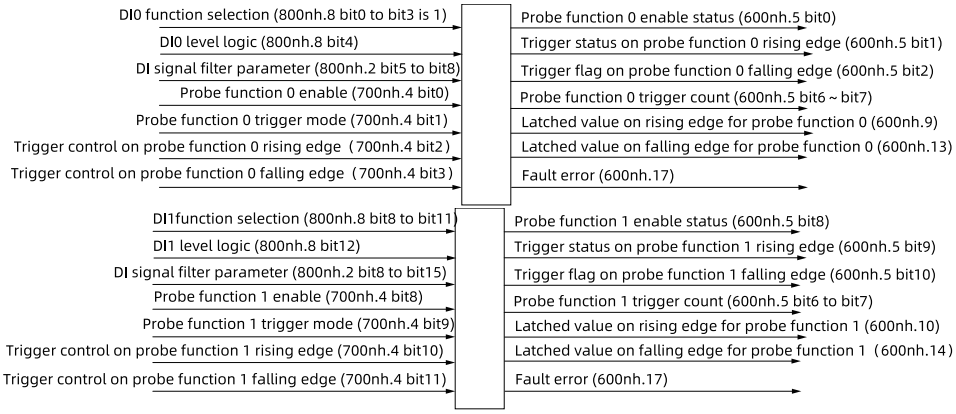


6.7 Touch Probe Function

Each counter can be configured with two probe functions. The probe signal input terminal can be the DI, after which is configured with the probe input mode. Configure parameters related to the probe function according to the following description. After the parameters are set correctly, the counter position value is reset to the preset value upon a DI input trigger signal or an internal trigger command. For specific definitions, see the parameter descriptions in the table below.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Note

- Before using the probe function, read the probe function description in detail and the relationship between external input signals and configurations (see *" Fault Diagnosis" on page 54*).
- The time interval between two probe triggers must be greater than 8 ms.

Parameter description

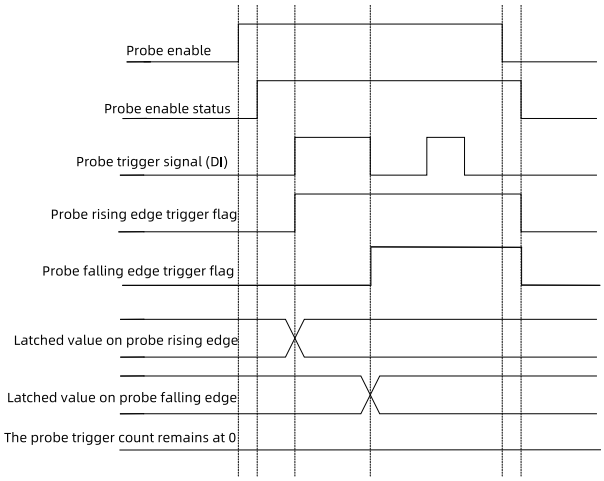
Name	Parameter	Value range	Default value	Description
DI function selection	800nh.8 bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	When used for the probe function, the DI terminal needs to be configured with the probe function. Otherwise, the probe function cannot be used.
DI level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DI signal.
DI signal filter parameter	800nh.2 bit8 to bit15	0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7	This parameter is used to suppress input interference. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. Two different filter types are set for DI signals. You can select a filter type based on actual conditions. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.
Probe enable	700nh.4 bit0	0: Invalid 1: Valid	-	The probe function is enabled when the signal is active and no other error occurs.

Name	Parameter	Value range	Default value	Description
Probe trigger mode	700nh.4 bit1	0: Single trigger 1: Continuous trigger mode	-	Single trigger: If the rising edge trigger enabling bit is active, the position value is latched upon the first rising edge of the DI. If the falling edge trigger enabling bit is active, the position value is latched upon the first falling edge of the DI. Continuous triggering: If the rising edge trigger enabling bit is active, the position value is locked at each rising edge of the DI. If the falling edge trigger enabling bit is active, the position value is locked at each falling edge of the DI.
Probe rising edge trigger control	700nh.4 bit2	0: Invalid 1: Valid	-	The latch function on the probe rising edge is enabled when the signal is active and no other error occurs.
Probe falling edge trigger control	700nh.4 bit3	0: Invalid 1: Valid	-	The latch function on the probe falling edge is enabled when the signal is active and no other error occurs.
Probe enabling status	600nh.5 bit0	0: Invalid 1: Valid	-	It is active when the probe enabling bit is active and no other error occurs.
Probe rising edge trigger flag	600nh.5 bit1	0: Invalid 1: Valid	-	It is active only upon the first rising edge trigger of the DI and the status remains unchanged. It is inactive when the probe enabling bit is inactive or when other errors occur.
Probe falling edge trigger flag	600nh.5 bit2	0: Invalid 1: Valid	-	It is active only upon the first falling edge trigger of the DI and the status remains unchanged. It is inactive when the probe enabling bit is inactive or when other errors occur.
Number of probe triggers	600nh.5 bit6 to bit7	0 to 3	-	This parameter is related to the parameter "Probe trigger mode". Single trigger: Invalid parameter Continuous trigger: When the DI is triggered once and the latch function is active, the parameter is added by 1. The parameter is cyclically added in the range of 0 to 3.
Latched position value on probe rising edge	600nh.9	-2147483648 to +2147483647	-	This parameter indicates the latch position value upon the rising edge trigger of the DI.

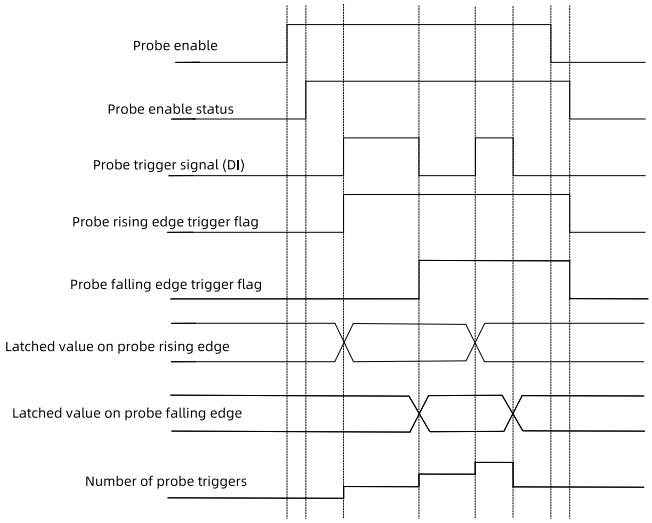
Name	Parameter	Value range	Default value	Description
Latched position value on probe falling edge	600nh.13	-2147483648 to +2147483647	-	This parameter indicates the latch position value upon the falling edge trigger of the DI.
Fault code	600nh.17	0	-	This parameter specifies the error code returned when the probe function is abnormal. For details, see *" Fault Diagnosis" on page 54*.

Sequence diagram

The time sequence diagram of the single trigger mode is as follows.



The time sequence diagram of the continuous trigger mode is as follows.



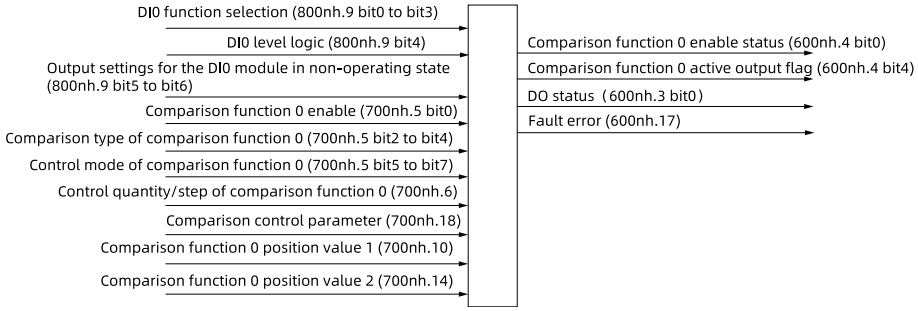
6.8 Comparison Function

Each counter channel can be configured with one comparison output. The comparison signal output terminal and the DO terminal are multiplexed. The DO must be configured for comparison output mode. When using this function, set each parameter individually according to the configuration

parameters and feedback information for the comparison preset function shown below. After correct parameter configuration, a comparison signal is output via DO when the current position equals the comparison position. For detailed definitions, see the parameter descriptions in the following table.

Configuration parameter and feedback information

Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Parameter description

Name	Parameter	Value range	Value range	Description
DI0 function selection	800nh.8 bit0 to bit3	0: Common output 1: Comparison output	0	When used as comparison function, the DO0 terminal must be configured for comparison. Otherwise, the comparison function is unavailable.
DI0 level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DO0 signal.
Output settings for the DI0 module in non-operating state	800nh.9 bit5 to bit6	0: Output 0 1: Output 1 2: Maintain	0	This parameter configures the output state of DO0 when the module is in a non-operating state.
Comparison function 0 enable	700nh.5 bit0	0: Invalid 1: Valid	0	The comparison function is enabled when the signal is active and no other error occurs.

Name	Parameter	Value range	Value range	Description
Comparison type of comparison function 0	700nh.5 bit2 to bit4	1: Multi-point comparison 2: Fixed-step comparison	0	• Multi-point comparison: The comparison output is based on the comparison position sent by the user. Multiple comparison points (maximum: 1024) can be output in sequence.• Note: The time interval between two comparison points must not be less than eight times the bus communication cycle. • Fixed-step comparison: The user specifies the start and end positions and the step size. Then, the module sequentially outputs comparison control signals based on the configured parameters. The stop position is not used for comparison output.
Control mode of comparison function 0	700nh.5 bit5 to bit7	1: time control 2: pulse control 3: level control	0	• Time control: The active signal is used to output the specified holding time. • Pulse control: The holding time of the active signal is determined by the number of pulses input to the counter. • Level control: When the comparison point matches the comparison output, the level of the active signal is inverted.
Control quantity/ step of comparison function 0	700nh.6	Quantity: 1 to 1024 Step: -32768 to -1, 1 to 32767	0	This parameter is related to the configuration of the parameter "Comparison type of comparison function 0". • Multi-point comparison: Number of comparison points. • Fixed-step comparison: Interval between comparison points (step)

Name	Parameter	Value range	Value range	Description
Comparison control parameter	700nh.18	0	0	This parameter is related to the configuration of the parameter "Comparison type of comparison function 0". Note: The two comparison output signals must not overlap. Otherwise, the function may execute abnormally. • Time control: The holding time of the comparison output signal is configurable in μs, with a minimum setting of 10 μs. • Pulse control: Number of pulses input to the counter. In this case, the holding time of the comparison output signal equals the number of counter pulses multiplied by the pulse cycle. • Level control: The value is the initial level. Only the lowest bit is active. When the value is 0, it indicates low level. When the value is 1, it indicates high level. The output level is inverted when the comparison output is active.
Comparison function 0 position value 1	700nh.10	-2147483648 to 2147483647	0	This parameter is related to the configuration of the parameter "Comparison type of comparison function 0". • Multi-point comparison: Comparison position value • Fixed-step comparison: Comparison start position
Comparison function 0 position value 2	700nh.14	-2147483648 to 2147483647	0	This parameter is related to the configuration of the parameter "Comparison type of comparison function 0". • Multi-point comparison: Invalid parameter • Fixed-step comparison: Comparison end position
Comparison function 0 enable status	600nh.4 bit0	0: Invalid; 1: Valid	-	When the comparison function 0 enable status is valid and no other error occurs, it will be active.

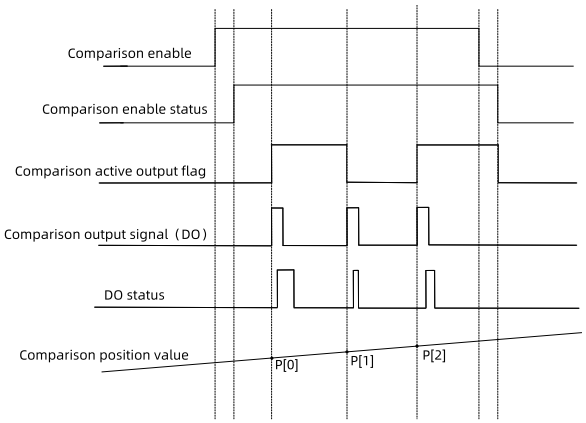
Name	Parameter	Value range	Value range	Description
Comparison function 0 active output flag	600nh.4 bit4	0/1	-	This parameter is related to the configuration of the parameter "Comparison type of comparison function 0". • Multi-point comparison: When the comparison point meets the conditions and the comparison output starts, the bit is inverted once. • Fixed-step comparison: When the last comparison point that meets the conditions starts output, the bit is inverted once.
DO0 status	600nh.3 bit0	0/1	-	This parameter indicates the DO0 output status. If the holding time of the comparison output signal is too short or the interval between two comparison outputs is too short, the DO0 status may not reflect the output state in real time due to signal delay. Consequently, the PLC task may fail to detect the status change, even though DO0 outputs normally.
Fault code	600nh.17	0	-	This parameter specifies the fault code returned when the comparison function is abnormal. For details, see "*Fault Diagnosis" on page 54*.

Note

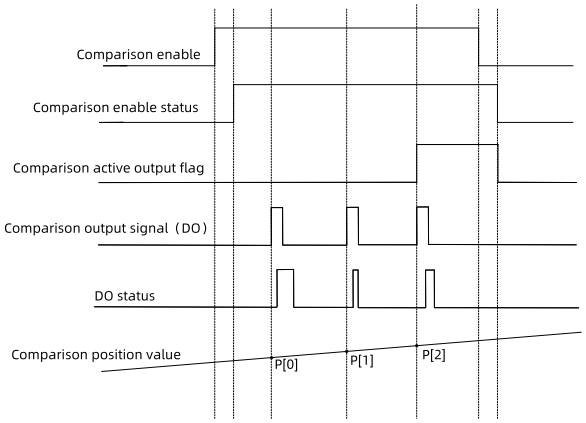
The time data related to the preceding parameters and comparison function is affected by the bus communication cycle and configuration of the communication interface module. The larger the communication cycle or configuration value, the larger the time data. Therefore, when the function is used, ensure the time interval is long enough based on the actual situation. The preceding time is measured when two GL20-2HC modules are expanded after the communication interface module is installed and when the bus communication cycle is 6 ms. For the relationship between configurations and communication cycles, see *"14.2 Appendix 2: Relationship Between Different Module Configurations and Communication Cycles" on page 76*.

Sequence diagram

The time sequence diagram of multi-point comparison is as follows.



The time sequence diagram of fixed-step comparison is as follows.

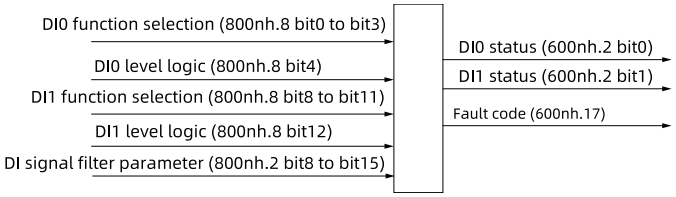


6.9 Digital Input Function

Each counter is configured with two DIs. When the DI is used as a common input function, configure the terminal to the normal input mode. Configure parameters related to the DI function according to the following description.

Configuration parameter and feedback information

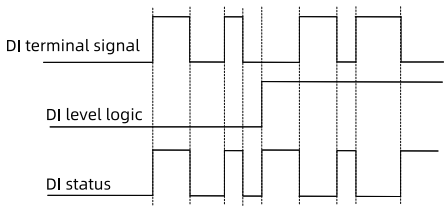
Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Parameter description

Name	Parameter	Value range	Default value	Description
DI function selection	800nh.8 bit0 to bit3	0: Normal input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0	When used as a normal DI, the DI terminal must be configured as standard input.
DI level logic	800nh.8 bit12	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DI signal.
DI signal filter parameter	800nh.2 bit8 to bit15	0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7	This parameter is used to suppress input interference. Signals whose holding time is shorter than the set time are suppressed. The filter parameter must be between 40% and 60% of the active signal. Two different filter types are set for DI signals. You can select a filter type based on actual conditions. The filter parameter must meet the condition that the active input signal holding time is longer than the filter time. The larger the parameter, the stronger the anti-interference capability.
DI1 status	600nh.2 bit0	0 1	-	This parameter indicates the DI1 input status.
DI2 status	600nh.2 bit1	0 1	-	This parameter indicates the DI2 input status.
Fault code	600nh.17	0	-	This parameter specifies the error code returned when the DI function is abnormal. For details, see *" Fault Diagnosis" on page 54*.

Sequence diagram

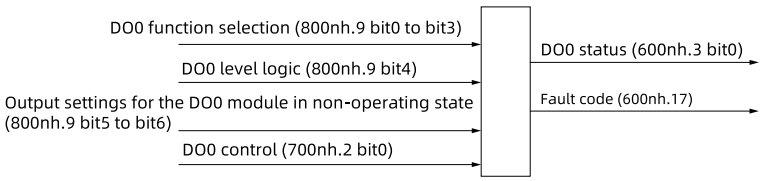


6.10 Digital Output Function

Each counter is configured with one DO. When the DO is used as a normal output function, configure the terminal to the normal output mode. Configure parameters related to the DO function according to the following description.

Configuration parameter and feedback information

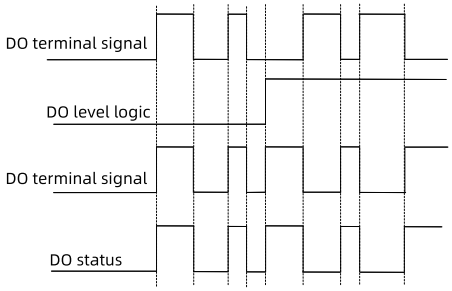
Take the first expansion slot after the communication interface module as an example to configure parameters and feedback information. The definitions for the second, third, and fourth slots are the same.



Parameter description

Name	Parameter	Value range	Default value	Description
DO0 function selection	800nh.9 bit0 to bit3	0: Common output 1: Comparison output	0	When used as a normal DO, the DO0 terminal must be configured as standard input.
DO0 level logic	800nh.9 bit4	0: Positive logic 1: Negative logic	0	This parameter defines the level logic of the DO0 signal.
Output settings for the DO0 module in non-operating state	800nh.9 bit5 to bit6	0: Output 0 1: Output 1	0	This parameter configures the output state of DO0 when the module is in a non-operating state.
DO0 control	700nh.2 bit0	0/1	-	This parameter is used to control DO0 output signals.
DO0 status	600nh.3 bit0	0/1	-	This parameter indicates the DO0 output status.
Fault code	600nh.17	0	-	This parameter specifies the fault code returned when the DO function is abnormal. For details, see *" Fault Diagnosis" on page 54*.

Sequence diagram



7 Technical Specifications

Mechanical specifications

Item	Specification
IP rating	IP20
Dimensions (W x H x D)	12 mm x 100 mm x 75 mm
Weight	Approx. 65 g

Software specifications

Item	Specification
Intput PDO data size	112 bytes
Output PDO data size	120 bytes
Output state mode during fault stop	• 0: Output 0 • 1: Output 1 • 2: Keep the current value Default: 0
Preset output value during fault stop	0 or 1
Output terminal fault detection and indication	None
Logic level configuration for output channels	Supported
Independent channel enable configuration	Not supported
Diagnostic reporting function	Supported
Output in the stop mode	According to output state mode during fault stop and preset output value, without further refreshing
I/O mapping	Supports bit, byte, and word access only

Note

The module stops upon fault in the following common scenarios:

- Background start/stop;
- The bus of GL20 communication interface module is out of communication due to disconnection of the network cable or manual state switching;
- The local bus stops operation.

Power supply specifications

Item	Specification
Rated bus input voltage	5 VDC (4.75 VDC to 5.25 VDC)
Rated bus input current	95 mA (typical@5 V)
Rated terminal input voltage	24 VDC (20.4 VDC to 28.8 VDC)
Rated terminal input current	50 mA (typical@24 V)
Rated terminal output voltage	None
Rated terminal output current	None
Module hot-swap	Not supported

Differential counting input specifications

Item	Specification
Input type	Counter input (pulse + direction, phase A/B, CW/CCW)
Input mode	Differential input
Number of input channels	2
Differential input voltage class	RS422 level (logic 0 < 200 mV; logic 1 > 200 mV)
Maximum input frequency	4 MHz
Disconnection detection	Supported
ON/OFF response time	100 ns/100 ns
Counting range	32 bits
Frequency measurement range	0.04 Hz to 4 MHz
Counting accuracy	100 ppm
Isolation	Yes
Input status display	The input indicator turns on (controlled by software) when the input is in drive state.

Single-ended input specifications

Item	GL20-2HC specifications	GL20-2HC-5V specifications
Input type	Digital input	
Input mode	Single-ended input, sink (NPN)/source (PNP)	
Number of input channels	4 (There are two counting channels, with each channel supporting phase A/B.)	
Frequency measurement range	0.04 Hz to 500 kHz	
Disconnection detection	Not supported	
Input voltage class	24 VDC (20.4 VDC to 28.8 VDC)	5 VDC (4 VDC to 6 VDC)
Input current (typical)	50 mA (typical@24 V)	
ON voltage	> 15 VDC	> 3.5 VDC
OFF voltage	< 5 VDC	< 2 VDC
Hardware response time upon ON/OFF	250 ns/250 ns	
Software filter time	Supported (filter parameter, default value)	
Input impedance	Reference: 5.3 kΩ to 7.6 kΩ	Reference: 1.5 kΩ to 2.5 kΩ
Isolation	Yes	
Input status display	The input indicator turns on (controlled by software) when the input is in drive state.	
Input derating	-	

Output specifications

Item	Specification
Output type	Digital output
Output mode	Sink (NPN)
Number of output channels	2
Output voltage class	24 VDC (20.4 VDC to 28.8 VDC)
Output load (resistive load)	0.5 A/channel; 1 A/module
Output load (inductive load)	7.2 W/channel; 14.4 W/module
Output load (lamp load)	5 W/channel; 10 W/module
Hardware response time upon ON/OFF	1 μs/1 μs

Item	Specification
Leakage current upon OFF	≤ 10 μA
Switching frequency	Resistive load: 100 Hz; inductive load: 0.5 Hz; lamp load: 10 Hz
Isolation	Yes
Output action display	The output indicator turns on (controlled by software) when the output is in drive state.
Output derating	None
Protection function	Protection against short circuit; protection against overcurrent shared by two channels

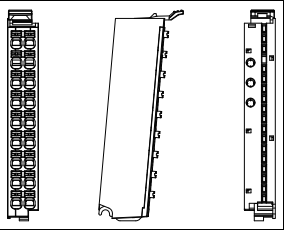
8 Environmental Specifications

Item	Specification
Installation/Operating 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	Level 2
Immunity	2 kV on power supply line (compliant with IEC 61000-4-4)
Overvoltage category	I
EMC immunity level	Zone B, IEC61131-2
ESD protection level	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; 10 cycles per axis. • Transportation scenario: Tested according to IEC60068-2-64, 0.01 g^2/Hz power spectral density at 5 Hz to 100 Hz; 0.001 g^2/Hz power spectral density at 200Hz; 1.14 g G_{rms}
Shock resistance	Application/Transportation scenario: Tested according to IEC60068-2-27; 15 g peak acceleration, 11 ms pulse width, 18 shocks in total in X, Y and Z axes.
Operating temperature/ humidity	• Temperature: -20°C to +55°C • Humidity: < 95% RH (30°C), without condensation
Storage temperature/ humidity	• Temperature: -20°C to +60°C. • Humidity: < 95% RH (30°C), without condensation
Transportation temperature/humidity	• Temperature: -40°C to +70°C. • Humidity: < 95% RH (40°C), without condensation

Note

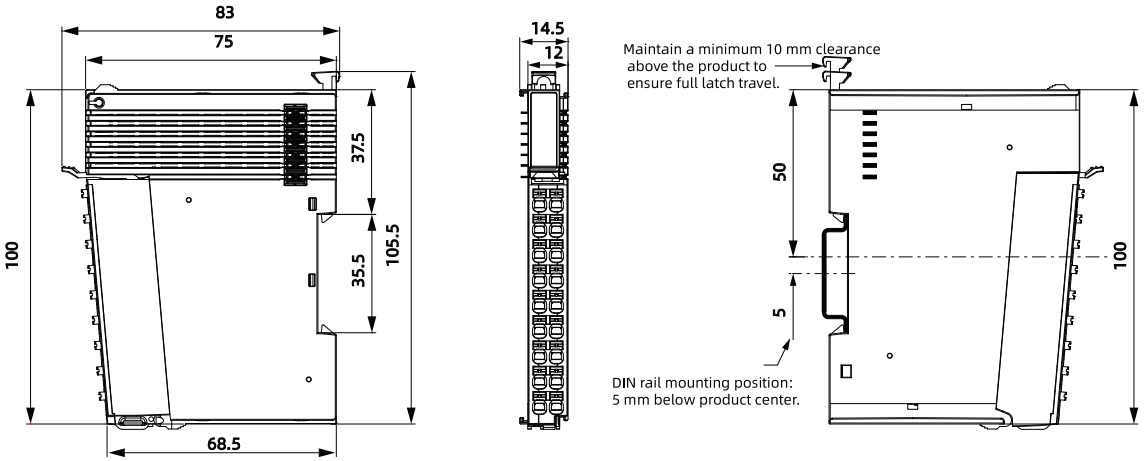
- When the module operates at a temperature of +55°C, only the single-channel counting function can be used. The other channel needs to be reset. When the module operates at a temperature of +45°C, dual-channel counting is supported.
- When the operating temperature exceeds +45°C, it is recommended to install a fan or air conditioner for cooling.

9 Spare Parts List

Name	Description	Product Code	Diagram
Push-in terminal block (marked as AB)	Pluggable terminal block with spring clamp wiring	15212496	

10 Dimension Drawing

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



11 Fault Diagnosis

When the module fails, you can view the fault code through the configuration software.

- **Module fault code**

Fault code	Description	Solution
5003h	External 24 V power failure	Check the external power supply wiring and the power supply voltage.
Others	-	See the communication interface guide for fault description.

- **Module channel fault code**

Fault code	Description	Cause
2100h	Preset value out of range	The preset value is larger than the maximum value or smaller than the minimum value.
2101h	Counter configuration error	• The single-ended counting function is enabled through commands, but the DI is not configured with the counting function. • The enabled single-ended interface does not match the configured DI for counting. • The counter is configured as a differential interface, but DI0 or DI1 is configured with the counting mode.
2102h	Signal type not supported	The signal type is not set to an allowed value, which includes phase A/B 1x frequency, phase A/B 2x frequency, phase A/B 4x frequency, pulse + direction, CW/CCW, single-phase counting (A), and single-phase counting (B).
2103h	Counter limit error	Maximum value ≤ Minimum value.
2104h	Incorrect setting of unit pulse increment	The unit pulse increment is less than 1.
2105h	Incorrect time base setting for speed measurement	The time base is not set to the allowed value. For allowed values, see 800nh.3.
2106h	Incorrect input filter parameter configuration	The input filter parameter is not set to the allowed value. For allowed values, see 800nh.2.
2107h	Frequency sampling time setting error	The frequency sampling time is not set to the allowed value. For allowed values, see 800nh.5.
2108h	Incorrect configuration of the clearing function	The clearing function is enabled through commands, but the DI is not configured with the clearing function.
2109h	Incorrect configuration of the preset function	The preset function is enabled through commands, but the DI is not configured with the preset function.
210Ah	Incorrect configuration of comparison function 0	The comparison function is enabled through commands, but the DO is not configured with the comparison function.
210Eh	Incorrect configuration of probe function 0	The probe function 0 is enabled through commands, but the DI is not configured with the probe function.
210Fh	Incorrect setting of probe function 1	The probe function 1 is enabled through commands, but the DI is not configured with the probe function.
2112h	DO0 parameter error	The parameter is not set to the allowed value, which includes normal output and comparison output.
2116h	DI0 parameter error	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.

Fault code	Description	Cause
2117h	DI1 parameter error	The parameter is not set to the allowed value, which includes normal input, probe function, counting, clear, preset, and gating.
6800h	Phase A open circuit	Phase A open circuit
6801h	Phase B open circuit	Phase B open circuit
6802h	Frequency out of limit	Differential interface: frequency > 4 MHz x frequency multiplication coefficient. Single-ended interface: frequency > 500 kHz x frequency multiplication coefficient.
6803h	Count value overflow	The counting value is larger than the maximum value.
6804h	Count value underflow	The counting value is smaller than the minimum value.
6805h	The quantity/step is out of range for the comparison function 0.	The quantity is larger than 1024 or smaller than 1, or the step equals 0.
6809h	The output hold time/pulse number is not configured properly for the comparison function 0.	The holding time is smaller than 10 or the pulse number is smaller than 1.
680Dh	The output start/stop position and step direction is not configured properly for the comparison function 0.	The start and stop positions are the same. The start position is smaller than the stop position. The step is smaller than 0. The start position is larger than the end position, but the step is 0.
6811h	The comparison value is out of range for the comparison function 0.	The comparison value is larger than the maximum value or smaller than the minimum value.
6815h	The type is not configured properly for the comparison function 0.	The comparison type is not set to the allowed value, which includes multi-point comparison and uniformly-spaced comparison.
6819h	The output control mode is not configured properly for the comparison function 0.	The control mode is not set to the allowed value, which includes time control, pulse control, and level control.
681Dh	A short circuit occurs in DO0.	DO0 short circuit

12 Object Dictionary

12.1 Configuration Parameters

Index	Sub-index	Data Type	Description	Access Type	Default	Definition
800nh	1	UDINT	CHn Encoder type	RW	0x00000000	800nh.1 See detailed information in *"14.1.1 Counter Type (CHn Encoder type)" on page 68*.
	2	UDINT	CHn Input filter	RW	0x00000702	800nh.2 See detailed information in *"14.1.2 Input Filter Parameter (CHn Input filter)" on page 69*.
	3	UDINT	CHn Time base for speed measurement	RW	0x00000005	800nh.3 See detailed information in *"14.1.3 Time Base for Speed Measurement (CHn Time base for speed measurement)" on page 69*.
	4	UDINT	CHn Unit pulse increment	RW	0x00000000	800nh.4 See detailed information in *"14.1.4 Unit Pulse Increment (CHn Unit pulse increment)" on page 69*.

Index	Sub-index	Data Type	Description	Access Type	Default	Definition
800nh	5	UDINT	CHn Pulse rate sample time	RW	0x000000-0A	800nh.5 See detailed information in *"14.1.5 Pulse Frequency Sampling Time (CHn Pulse rate sample time)" on page 69*.
	6	DINT	CHn Maximum count value	RW	0x7FFFFFFF	800nh.6 See detailed information in *"14.1.6 Maximum Counter Value (CHn Maximum count value)" on page 70*.
	7	DINT	CHn Minimum count value	RW	0x800000-00	800nh.7 See detailed information in *"14.1.7 Minimum Counter Value (CHn Minimum count value)" on page 70*.
	8	UDINT	CHn External input function selection	RW	0x000000-00	800nh.8 See detailed information in *"14.1.8 External Input Function Selection (CHn External input function selection)" on page 70*.
	9	UDINT	CHn External output function selection	RW	0x000000-00	800nh.9 See detailed information in *"14.1.9 External Output Function Selection (CHn External output function selection)" on page 70*.

12.2 Input PDO Parameters

Index	Sub-index	Data Type	Description	Access Type	Definition
600nh	1	USINT	CHn Encoder status	RO	600nh.1 See detailed information in *"14.1.10 Counter Status (CHn Encoder status)" on page 71*.
	2	USINT	CHn DI status	RO	600nh.2 See detailed information in *"14.1.11 DI Status (CHn DI status)" on page 71*.
	3	USINT	CHn DO status	RO	600nh.3 See detailed information in *"14.1.12 DO Status (CHn DO status)" on page 71*.
	4	USINT	CHn Compare status	RO	600nh.4 See detailed information in *"14.1.13 Comparison Function Status (CHn Compare status)" on page 72*.
600nh	5	UDINT	CHn Probe status	RO	600nh.5 See detailed information in *"14.1.14 Probe Function Status (CHn Probe status)" on page 72*.
	6	DINT	CHn Encoder present position	RO	600nh.6 See detailed information in *"14.1.15 Counter Position Value (CHn encoder present position)" on page 72*.
	7	UDINT	CHn Measure value 1	RO	600nh.7 See detailed information in *"14.1.16 Measured Value 1 (CHn Measure value 1)" on page 72*.
	8	UDINT	CHn Measure value 2	RO	600nh.8 See detailed information in *"14.1.17 Measured Value 2 (CHn Measure value 2)" on page 72*.

Index	Sub-index	Data Type	Description	Access Type	Definition
600nh	9	DINT	CHn Probe 0 positive value	RO	600nh.9 See detailed information in *"14.1.18 Latching Value at Rising Edge for Probe Function Channel 0 (CHn Probe 0 positive value)" on page 73*.
	10	DINT	CHn Probe 1 positive value	RO	600nh.10 See detailed information in *"14.1.19 Latching Value at Rising Edge for Probe Function Channel 1 (CHn Probe 1 positive value)" on page 73*.
	11	DINT	CHn Reserve600	-	-
	12	DINT	CHn Reserve601	-	-
	13	DINT	CHn Probe 0 negative value	RO	600nh.13 See detailed information in *"14.1.20 Latching Value at Falling Edge for Probe Function Channel 0 (CHn Probe 0 negative value)" on page 73*.
600nh	14	DINT	CHn Probe 1 negative value	RO	600nh.14 See detailed information in *"14.1.21 Latching Value at Falling Edge for Probe Function Channel 1 (CHn Probe 1 negative value)" on page 73*.
	15	DINT	CHn Reserve602	-	-
	16	DINT	CHn Reserve603	-	-
	17	DINT	CHn Error code	RO	600nh.17 See detailed information in *"14.1.22 Error Code (CHn Error code)" on page 73*.

12.3 Output PDO Parameter

Index	Subindex	Data Type	Description	Access Type	Definition
700nh	1	UINT	CH0 Encoder command value	RW	700nh.1 For details, see *"14.1.23 Counter Control Command Value (CHn Encoder command value)" on page 73*
	2	UINT	CH0 DO function command value	RW	700nh.2 For details, see *"14.1.24 DO Function Command Value (CHn DO function command value)" on page 74*
	3	DINT	CH0 Encoder preset value	RW	700nh.3 For details, see *"14.1.25 Counter Preset Value (CHn Encoder preset value)" on page 74*
	4	UDINT	CH0 Probe function command value	RW	700nh.4 For details, see *"14.1.26 Probe Function Command Value (CHn Probe function command value)" on page 74*
	5	UDINT	CH0 Compare function command value	RW	700nh.5 For details, see *"14.1.27 Comparison Function Command Value (CHn Compare function command value)" on page 74*
	6	INT	CH0 Compare 0 command size/step	RW	700nh.6 For details, see *"14.1.28 Command Number or Step of Comparison Function Channel 0 (CHn Compare 0 command size or step)" on page 75*
	7	INT	CHn Reserve700	-	-
	8	INT	CHn Reserve701	-	-

Index	Subindex	Data Type	Description	Access Type	Definition
700nh	9	INT	CHn Reserve702	-	-
	10	DINT	CHn Compare 0 position value 1	RW	700nh.10 For details, see *"14.1.29 Position Value 1 of Comparison Function Channel 0 (CHn Compare 0 position value 1)" on page 75*
	11	DINT	CHn Reserve703	-	-
	12	DINT	CHn Reserve704	-	-
	13	DINT	CHn Reserve705	-	-
	14	DINT	CHn Compare 0 position value 2	RW	700nh.14 For details, see *"14.1.30 Position Value 2 of Comparison Function Channel 0 (CHn Compare 0 position value 2)" on page 75*
	15	DINT	CHn Reserve706	-	-
	16	DINT	CHn Reserve707	-	-
	17	DINT	CHn Reserve708	-	-
	18	UDINT	CHn Compare function command parameter	RW	700nh.18 For details, see *"14.1.31 Comparison Function Control Parameter (CHn Compare function command parameter)" on page 76*

12.4 Diagnostic Parameters

Index	Sub-index	Data Type	Description	Access Type	Definition
A00nh	1	UINT	Module Diagnosis information	RO	Module error See the module channel fault code in *"Fault Diagnosis" on page 54*.
	2	UINT	Ch0 Diagnostic information	RO	
	3	UINT	Ch1 Diagnostic information	RO	

13 Address Space

13.1 Overview

If the GL20-2HC module is configured with the GL20-RTU-PN coupler, up to four GL20-2HC modules are supported. The four GL20-2HC modules can be installed only in the first four slots in the configuration.

When the GL20-2HC module is used with the GL20-RTU-PN coupler, the process data of the module is accessed in the form of the first address plus the offset address. The offset address of the process data for different slots is the same. The first address is assigned automatically or manually in the TIA Portal software. For offset addresses, see *"13.2 Input PDO Parameters" on page 62* and *"13.3 Output PDO Parameters" on page 65*.

13.2 Input PDO Parameters

Offset Address	Data Type	Description	Access Type	Definition
0	USINT	CH0 Encoder status	RO	600nh.1 See detailed information in *"14.1.10 Counter Status (CHn Encoder status)" on page 71*.
1	USINT	CH0 DI status	RO	600nh.2 See detailed information in *"14.1.11 DI Status (CHn DI status)" on page 71*.
2	USINT	CH0 DO status	RO	600nh.3 See detailed information in *"14.1.12 DO Status (CHn DO status)" on page 71*.
3	USINT	CH0 Compare status	RO	600nh.4 See detailed information in *"14.1.13 Comparison Function Status (CHn Compare status)" on page 72*.
4 to 7	UDINT	CH0 Probe status	RO	600nh.5 See detailed information in *"14.1.14 Probe Function Status (CHn Probe status)" on page 72*.
8 to 11	DINT	CH0 Encoder present position	RO	600nh.6 See detailed information in *"14.1.15 Counter Position Value (CHn encoder present position)" on page 72*.

Offset Address	Data Type	Description	Access Type	Definition
12 to 15	UDINT	CH0 Measure value 1	RO	600nh.7 See detailed information in *"14.1.16 Measured Value 1 (CHn Measure value 1)" on page 72*.
16 to 19	UDINT	CH0 Measure value 2	RO	600nh.8 See detailed information in *"14.1.17 Measured Value 2 (CHn Measure value 2)" on page 72*.
20 to 23	DINT	CH0 Probe 0 positive value	RO	600nh.9 See detailed information in *"14.1.18 Latching Value at Rising Edge for Probe Function Channel 0 (CHn Probe 0 positive value)" on page 73*.
24 to 27	DINT	CH0 Probe 1 positive value	RO	600nh.10 See detailed information in *"14.1.19 Latching Value at Rising Edge for Probe Function Channel 1 (CHn Probe 1 positive value)" on page 73*.
28 to 35	DINT	Reserved	-	-
36 to 39	DINT	CH0 Probe 0 negative value	RO	600nh.13 See detailed information in *"14.1.20 Latching Value at Falling Edge for Probe Function Channel 0 (CHn Probe 0 negative value)" on page 73*.
40 to 43	DINT	CH0 Probe 1 negative value	RO	600nh.14 See detailed information in *"14.1.21 Latching Value at Falling Edge for Probe Function Channel 1 (CHn Probe 1 negative value)" on page 73*.
44 to 51	DINT	Reserved	-	-
52 to 55	UDINT	CH0 Error code	RO	600nh.17 See detailed information in *"14.1.22 Error Code (CHn Error code)" on page 73*.
56	USINT	CH1 Encoder status	RO	600nh.1 See detailed information in *"14.1.10 Counter Status (CHn Encoder status)" on page 71*.

Offset Address	Data Type	Description	Access Type	Definition
57	USINT	CH1 DI status	RO	600nh.2 See detailed information in *"14.1.11 DI Status (CHn DI status)" on page 71*.
58	USINT	CH1 DO status	RO	600nh.3 See detailed information in *"14.1.12 DO Status (CHn DO status)" on page 71*.
59	USINT	CH1 Compare status	RO	600nh.4 See detailed information in *"14.1.13 Comparison Function Status (CHn Compare status)" on page 72*.
60 to 63	UDINT	CH1 Probe status	RO	600nh.5 See detailed information in *"14.1.14 Probe Function Status (CHn Probe status)" on page 72*.
64 to 67	DINT	CH1 Encoder present position	RO	600nh.6 See detailed information in *"14.1.15 Counter Position Value (CHn encoder present position)" on page 72*.
68 to 71	UDINT	CH1 Measure value 1	RO	600nh.7 See detailed information in *"14.1.16 Measured Value 1 (CHn Measure value 1)" on page 72*.
72 to 75	UDINT	CH1 Measure value 2	RO	600nh.8 See detailed information in *"14.1.17 Measured Value 2 (CHn Measure value 2)" on page 72*.
76 to 79	DINT	CH1 Probe 0 positive value	RO	600nh.9 See detailed information in *"14.1.18 Latching Value at Rising Edge for Probe Function Channel 0 (CHn Probe 0 positive value)" on page 73*.
80 to 83	DINT	CH1 Probe 1 positive value	RO	600nh.10 See detailed information in *"14.1.19 Latching Value at Rising Edge for Probe Function Channel 1 (CHn Probe 1 positive value)" on page 73*.
84 to 91	DINT	Reserved	-	-

Offset Address	Data Type	Description	Access Type	Definition
92 to 95	DINT	CH1 Probe 0 negative value	RO	600nh.13 See detailed information in *"14.1.20 Latching Value at Falling Edge for Probe Function Channel 0 (CHn Probe 0 negative value)" on page 73*.
96 to 99	DINT	CH1 Probe 1 negative value	RO	600nh.14 See detailed information in *"14.1.21 Latching Value at Falling Edge for Probe Function Channel 1 (CHn Probe 1 negative value)" on page 73*.
100 to 107	DINT	Reserved	-	-
108 to 111	UDINT	CH1 Error code	RO	600nh.17 See detailed information in *"14.1.22 Error Code (CHn Error code)" on page 73*.

13.3 Output PDO Parameters

Offset Address	Data Type	Description	Access Type	Definition
0 to 1	UINT	CH0 Encoder command value	RW	700nh.1 See detailed information in *"14.1.23 Counter Control Command Value (CHn Encoder command value)" on page 73*.
2 to 3	UINT	CH0 DO function command value	RW	700nh.2 See detailed information in *"14.1.24 DO Function Command Value (CHn DO function command value)" on page 74*.
4 to 7	DINT	CH0 Encoder preset value	RW	700nh.3 See detailed information in *"14.1.25 Counter Preset Value (CHn Encoder preset value)" on page 74*.
8 to 11	UDINT	CH0 Probe function command value	RW	700nh.4 See detailed information in *"14.1.26 Probe Function Command Value (CHn Probe function command value)" on page 74*.

Offset Address	Data Type	Description	Access Type	Definition
12 to 15	UDINT	CH0 Compare function command value	RW	700nh.5 See detailed information in *"14.1.27 Comparison Function Command Value (CHn Compare function command value)" on page 74*.
16 to 17	INT	CH0 Compare 0 command size/step	RW	700nh.6 See detailed information in *"14.1.28 Command Number or Step of Comparison Function Channel 0 (CHn Compare 0 command size or step)" on page 75*.
18 to 23	INT	Reserved	-	-
24 to 27	DINT	CH0 Compare 0 position value 1	RW	700nh.10 See detailed information in *"14.1.29 Position Value 1 of Comparison Function Channel 0 (CHn Compare 0 position value 1)" on page 75*.
28 to 39	DINT	Reserved	-	-
40 to 43	DINT	CH0 Compare 0 position value 2	RW	700nh.14 See detailed information in *"14.1.30 Position Value 2 of Comparison Function Channel 0 (CHn Compare 0 position value 2)" on page 75*.
44 to 55	DINT	Reserved	-	-
56 to 59	UDINT	CH0 Compare command parameter	RW	700nh.18 See detailed information in *"14.1.31 Comparison Function Control Parameter (CHn Compare function command parameter)" on page 76*.
60 to 61	UINT	CH1 Encoder command value	RW	700nh.1 See detailed information in *"14.1.23 Counter Control Command Value (CHn Encoder command value)" on page 73*.
62 to 63	UINT	CH1 DO function command value	RW	700nh.2 See detailed information in *"14.1.24 DO Function Command Value (CHn DO function command value)" on page 74*.

Offset Address	Data Type	Description	Access Type	Definition
64 to 67	DINT	CH1 Encoder preset value	RW	700nh.3 See detailed information in *"14.1.25 Counter Preset Value (CHn Encoder preset value)" on page 74*.
68 to 71	UDINT	CH1 Probe function command value	RW	700nh.4 See detailed information in *"14.1.26 Probe Function Command Value (CHn Probe function command value)" on page 74*.
72 to 75	UDINT	CH1 Compare function command value	RW	700nh.5 See detailed information in *"14.1.27 Comparison Function Command Value (CHn Compare function command value)" on page 74*.
76 to 77	INT	CH1 Compare 0 command size/step	RW	700nh.6 See detailed information in *"14.1.28 Command Number or Step of Comparison Function Channel 0 (CHn Compare 0 command size or step)" on page 75*.
78 to 83	INT	Reserved	-	-
84 to 87	DINT	CH1 Compare 0 position value 1	RW	700nh.10 See detailed information in *"14.1.29 Position Value 1 of Comparison Function Channel 0 (CHn Compare 0 position value 1)" on page 75*.
88 to 99	DINT	Reserved	-	-
100 to 103	DINT	CH1 Compare 0 position value 2	RW	700nh.14 See detailed information in *"14.1.30 Position Value 2 of Comparison Function Channel 0 (CHn Compare 0 position value 2)" on page 75*.
104 to 115	DINT	Reserved	-	-
116 to 119	UDINT	CH1 Compare command parameter	RW	700nh.18 See detailed information in *"14.1.31 Comparison Function Control Parameter (CHn Compare function command parameter)" on page 76*.

14 Appendix

14.1 Appendix 1: Parameter Description

14.1.1 Counter Type (CHn Encoder type)

Bit	Description	Default
0	Counter type 0: Linear 1: Annular	0
1	Counting direction 0: Phase A leads phase B (forward). 1: Phase B leads phase A (reverse).	0
3 to 2	Measured value 0: Not measuring 1: Frequency 2: Cycle 3: Speed	0
7 to 4	Pulse input mode 0: Phase A/B 1x frequency 1: Phase A/B 2x frequency 2: Phase A/B 4x Frequency 3: Pulse+Direction 4: CW/CCW 5: Single-phase counting (A) 6: Single-phase counting (B)	0
8	Wiring method 0: Differential interface 1: Single-ended interface	0
9	Disconnection detection (valid only for differential interface) 0: Disable 1: Enable	0
10	Action upon exceeding count limit 0: Stop counting 1: Continue counting	0
13 to 11	Reserved	0
14	Sleep control (When this function is enabled, all functions of the entire channel are disabled.) 0: Disable sleep mode 1: Enable sleep mode	0
31 to 15	Reserved	0

14.1.2 Input Filter Parameter (CHn Input filter)

Bit	Description	Default
7 to 0	Counting signal filter parameter 1: 50 ns; 2: 100 ns; 3: 200 ns; 4: 500 ns; 5: 1 μs; 6: 2 μs; 7: 5μs; 8: 10μs; 9: 20 μs; 10: 50 μs; 11: 100 μs; 12: 200 μs; 13: 500 μs; 14: 1 ms; 15: 2 ms; 16: 5 ms; 17: 10 ms; 18: 20 ms; 19: 50 ms; 20: 100 ms	2
15 to 8	DI signal filter parameter 0: No filtering Filter type 1 1: 100 ns; 2: 500 ns; 3: 1 μs; 4: 100 μs; 5: 250 μs; 6: 500 μs; 7: 1 ms; 8: 2 ms; 9: 4 ms; 10: 8 ms; 11: 16 ms; 12: 32 ms Filter type 2 32: 100 ns; 33: 500 ns; 34: 1 μs; 35: 100 μs; 36: 250 μs; 37: 500 μs; 38: 1 ms; 39: 2 ms; 40: 4 ms; 41: 8 ms; 42: 16 ms; 43: 32 ms	7
31 to 16	Reserved	0

14.1.3 Time Base for Speed Measurement (CHn Time base for speed measurement)

Bit	Description	Default
7 to 0	Time base for speed measurement 1: 1ms; 2: 10 ms; 3: 100 ms; 4: 1s; 5: 60s	5
31 to 8	Reserved	0

14.1.4 Unit Pulse Increment (CHn Unit pulse increment)

Bit	Description	Default
15 to 0	The value must be smaller than or equal to 65535.	0
31 to 16	Reserved	0

14.1.5 Pulse Frequency Sampling Time (CHn Pulse rate sample time)

Bit	Description	Default
7 to 0	3: 500 us; 4: 1 ms; 5: 2 ms; 6: 5 ms; 7: 10 ms; 8: 20 ms; 9: 50 ms; 10: 100 ms; 11: 200 ms; 12: 500 ms; 13: 1s; 14: 2s 15: 5s; 16: 10s; 17: 20s; 18: 25s	10
31 to 8	Reserved	0

14.1.6 Maximum Counter Value (CHn Maximum count value)

Bit	Description	Default
31 to 0	Maximum counter value, which needs to be set to a value smaller than or equal to 2147483647	2147483647

14.1.7 Minimum Counter Value (CHn Minimum count value)

Bit	Description	Default
31 to 0	Minimum counter value, which needs to be set to a value greater than or equal to -2147483648	-2147483648

14.1.8 External Input Function Selection (CHn External input function selection)

Bit	Description	Default
3 to 0	DI0 function selection 0: Standard input 1: Probe function 2: Counting 3: Clear 4: Preset 5: Gating	0
4	DI0 level logic 0: Positive logic 1: Negative logic	0
7 to 5	Reserved	0
15 to 8	DI1 function selection (same as DI0)	0
31 to 16	Reserved	0

14.1.9 External Output Function Selection (CHn External output function selection)

Bit	Description	Default
3 to 0	DO0 function selection 0: Common output 1: Comparison output	0
4	DO0 level logic 0: Positive logic 1: Negative logic	0

Bit	Description	Default
6 to 5	Output settings when the module is not running 0: Output 0 1: Output 1 2: Hold	0
31 to 7	Reserved	0

14.1.10 Counter Status (CHn Encoder status)

Bit	Description
0	Counter status 0: Stop counting 1: Counter operating normally
1	Completion flag for counter clearing through internal commands 0: Inactive 1: Completed
2	Completion flag for counter preset through internal commands 0: Inactive 1: Completed
3	Counting direction 0: Same direction 1: Reverse direction
4	Counter overflow
5	Frequency out of limit
6	Phase A disconnection
7	Phase B disconnection

14.1.11 DI Status (CHn DI status)

Bit	Description
0	DI0 status
1	DI1 status
2	Reserved
3	Reserved
4	Counter clearing enabling through external signals
5	Completion for counter clearing through external signal
6	Counter preset enabling through external signals
7	Completion for counter preset through external signal

14.1.12 DO Status (CHn DO status)

Bit	Description
0	DO0 status
7 to 1	Reserved

14.1.13 Comparison Function Status (CHn Compare status)

Bit	Note
0	Comparison function channel 0 enable
3 to 1	Reserved
4	Comparison function channel 0 output valid
7 to 5	Reserved

14.1.14 Probe Function Status (CHn Probe status)

Bit	Description
0	0: Disable the probe function 1: Enable the probe function
1	Probe rising edge trigger flag 0: Not triggered 1: Triggered
2	Probe falling edge trigger flag 0: Not triggered 1: Triggered
5 to 3	Reserved
7 to 6	Number of trigger times for probe function channel 0, ranging from 0 to 3. In continuous trigger mode, the number is increased by 1 each triggering action.
15 to 8	Functions of probe function channel 1 (same as functions of probe function channel 0)
31 to 16	Reserved

14.1.15 Counter Position Value (CHn encoder present position)

Bit	Description
31 to 0	Current counter position value

14.1.16 Measured Value 1 (CHn Measure value 1)

Bit	Description
31 to 0	Integer part of the measured value

14.1.17 Measured Value 2 (CHn Measure value 2)

Bit	Description
31 to 0	The decimal part of the measured value equals the value after the actual value is multiplied by $10^{8,}$ and then rounded.

14.1.18 Latching Value at Rising Edge for Probe Function Channel 0 (CHn Probe 0 positive value)

Bit	Description
31 to 0	Latching value at rising edge for probe function channel 0

14.1.19 Latching Value at Rising Edge for Probe Function Channel 1 (CHn Probe 1 positive value)

Bit	Description
31 to 0	Latching value at rising edge for probe function channel 1

14.1.20 Latching Value at Falling Edge for Probe Function Channel 0 (CHn Probe 0 negative value)

Bit	Description
31 to 0	Latching value at falling edge for probe function channel 0

14.1.21 Latching Value at Falling Edge for Probe Function Channel 1 (CHn Probe 1 negative value)

Bit	Description
31 to 0	Latching value at falling edge for probe function channel 1

14.1.22 Error Code (CHn Error code)

Bit	Description
31 to 0	Error code. For details, see “ *Fault Diagnosis*” *on page 54*.

14.1.23 Counter Control Command Value (CHn Encoder command value)

Bit	Description
0	Counter enable 0: Disable 1: Enable
1	Counter clearing through internal commands
2	Counter preset enabling through internal commands
3	Counter clearing enabling through external signals

Bit	Description
4	Clear completion flag for counter clearing through external signals
5	Counter preset enabling through external signals
6	Clear completion flag for counter preset through external signals
15 to 7	Reserved

14.1.24 DO Function Command Value (CHn DO function command value)

Bit	Description
0	DO0 output control
15 to 1	Reserved

14.1.25 Counter Preset Value (CHn Encoder preset value)

Bit	Description
31 to 0	The value is between the maximum value and the minimum value of the counter.

14.1.26 Probe Function Command Value (CHn Probe function command value)

Bit	Description
0	Probe function channel 0 enable 0: Disable 1: Enable
1	Trigger mode of probe function channel 0 0: Single trigger 1: Continuous trigger
2	Latching control at rising edge for probe function channel 0 0: Disable latching at rising edge 1: Enable latching at rising edge
3	Latching control at falling edge for probe function channel 0 0: Disable latching at falling edge 1: Enable latching at falling edge
7 to 4	Reserved
15 to 8	Probe function channel 1 (same as probe function channel 0)
31 to 16	Reserved

14.1.27 Comparison Function Command Value (CHn Compare function command value)

Bit	Description
0	Comparison function channel 0 enable 0: Disable 1: Enable
1	Reserved

Bit	Description
4 to 2	Comparison type of comparison function channel 0 1: Multi-point comparison 2: Uniformly-spaced comparison
7 to 5	Control mode of comparison function channel 0 1: Time control 2: Pulse control 3: Level control
31 to 8	Reserved

14.1.28 Command Number or Step of Comparison Function Channel 0 (CHn Compare 0 command size or step)

Bit	Description
15 to 0	Multi-point comparison: Number of comparison points Uniformly-spaced comparison: Interval between comparison points (step)

14.1.29 Position Value 1 of Comparison Function Channel 0 (CHn Compare 0 position value 1)

Bit	Description
31 to 0	Multi-point comparison: Comparison position value Uniformly-spaced comparison: Comparison start position

14.1.30 Position Value 2 of Comparison Function Channel 0 (CHn Compare 0 position value 2)

Bit	Description
31 to 0	Multi-point comparison: Invalid parameter Uniformly-spaced comparison: Comparison end position

14.1.31 Comparison Function Control Parameter (CHn Compare function command parameter)

Bit	Description
31 to 0	Time control: Holding time (in the unit of μs) of the comparison output signal, with the minimum of 10 μs. Pulse control: Number of pulses input to the counter. In this case, the holding time of the comparison output signal equals the number of counter pulses multiplied by the pulse cycle. Level control: The value is the initial level. Only the lowest bit is active. When the value is 0, it indicates low level. When the value is 1, it indicates high level. The output level is inverted when the comparison output is active.

14.1.32 Module Fault Information (Module Diagnosis information)

Bit	Description
16 to 0	Record the fault information of the module. For details, see " *Fault Diagnosis*" on *page 54*.

14.1.33 Channel 0 Fault Information (Ch0 Diagnosis information)

Bit	Description
16 to 0	Record the fault information of channel 0. For details, see " *Fault Diagnosis*" on *page 54*.

14.1.34 Channel 1 Fault Information (Ch1 Diagnosis information)

Bit	Description
16 to 0	Record the fault information of channel 1. For details, see " *Fault Diagnosis*" on *page 54*.

14.2 Appendix 2: Relationship Between Different Module Configurations and Communication Cycles

When the GL20-2HC module is used with the GL20-RTU-ECT32 communication interface module, the relationship between different configurations and communication cycles is shown in the following table.

Configuration	Number of Modules	Minimum Cycle (μs) of EtherCAT Communication
N*2HC	n = 1	3000
	n = 2	5000
	n = 3	6000
	n = 4	7000
n x 2Hc + m x IO(16)	n = 1, m = 15	4000
	n = 2, m = 14	6000
	n = 3, m = 13	7000
	n = 4, m = 12	8000
n x 2HC + m x IO(32)	n = 1, m = 31	5000
	n = 2, m = 30	6000
	n = 3, m = 29	8000
	n = 4, m = 28	9000
4*2HC+n*2S485+m*IO(16)	n = 1, m = 11	8000
	n = 2, m = 10	9000
	n = 3, m = 9	9000
	n = 4, m = 8	9000
4*2HC+n*2S485+m*IO(32)	n = 1, m = 27	9000
	n = 2, m = 26	10000
	n = 3, m = 25	10000
	n = 4, m = 24	10000

Note

The I/O module refers to the DI/DO module, analog module, and temperature module.

14.3 Appendix 3: Relationship Between External Input Signals and Module Configuration When the Probe Function Is Used

The following table shows the relationship between external input signals and configurations when the probe function is enabled for the GL20-2HC module used with the GL20-RTU-PN module.

Configuration	Number of modules	External minimum input cycle (μs)
n x 2HC	n = 1	5000
	n = 2	6000
	n = 3	7000
	n = 4	7000
n x 2HC + m x IO (16)	n = 1; m = 15	8000
	n = 2; m = 14	8000
	n = 3; m = 13	9000
	n = 4; m = 12	9000
n x 2HC + m x IO (32)	n = 1; m = 31	10000
	n = 2; m = 30	11000
	n = 3; m = 29	11000
	n = 4; m = 28	12000

Note

The I/O module refers to the DI/DO module, analog module, and temperature module.

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