GLC Signal Isolator

I. Product Definition

The Qidian GLC Signal Isolator is an integrated module for industrial analog signal isolation, transmission, noise suppression, and power distribution, designed for the safe transmission and matching of standard signals such as 4–20 mA and 0–10 V.

Electrical Isolation: Breaks ground loops, blocks common-mode interference, and eliminates signal drift caused by ground potential differences.

Signal Transmission: Performs signal conversion, amplification, and distribution to adapt to different instrument and PLC interfaces.

Strong Interference Suppression: Suppresses industrial electromagnetic interference from sources such as inverters, motors, and lightning surges

Power Distribution: Provides 24V isolated power supply for two-wire transmitters, simplifying field wiring

II. Working Principle

The module employs a full-process workflow of Input → Modulation → Isolation Coupling → Demodulation → Output, with the core being three-terminal magnetic-electrical isolation (input, output, and power supply are mutually independent).

Signal Input: Receives analog signals such as 4-20mA and 0-10V from sensors and transmitters

Modulation and Isolation: Converts electrical signals into magnetic or optical signals, physically severing electrical connections

Signal Processing: Filters, amplifies, and calibrates for accuracy, eliminating interference and noise

Stable Output: Reconstructs the signal into a standard format for supply to PLCs, DCS systems, and display instruments

Core Advantages of Three-Port Isolation

The input, output, and power supply are completely electrically isolated from one another, preventing mutual interference. This eliminates ground loop interference and high-voltage intrusion at the source, while simultaneously meeting explosion-proof and safety standards.

III. Core Value

1. Non-Isolated Signal Transmitters: Typical Pain Points in Industrial Settings

-- Signal Instability: Prone to interference from inverters, motors, and cables, resulting in data jumps, drift, and distortion, leading to inaccurate measurement and control.

-- Severe Ground Loop Interference: Shared grounding among multiple devices creates ground potential differences, generating loop currents that cause signal abnormalities and hinder stable system operation.

-- Equipment Vulnerability: High-voltage intrusion, surges, and induced currents from lightning strikes directly impact PLCs, DCS systems, and instrument ports, often causing module burnout.

-- Limited Transmission Distance: Significant signal attenuation over long distances and insufficient drive capability render the system unusable in long-range applications.

-- Safety and Compliance Deficiencies: Lack of electrical isolation fails to meet explosion-proof requirements in hazardous areas, posing safety hazards and compliance risks.

--Short system lifespan: Prolonged exposure to interference and voltage surges leads to high failure rates in instruments and controllers, requiring frequent maintenance and shortening the overall lifespan.

2. Using Qidian GLC Signal Isolators: Core Value and Advantages

--More stable signal transmission: Provides strong anti-interference capabilities, filters out noise and interference, eliminates signal fluctuations and drift, and ensures accurate and reliable 4-20mA/0-10V signals.

- - Completely Resolves Ground Loop Issues: Three-terminal electrical isolation cuts off ground potential differences and common-mode interference, eliminating loop interference at its source.

-- Comprehensive Protection for Downstream Equipment: Isolates high voltage, surges, and overcurrent, preventing damage to PLCs, DCS systems, and data acquisition modules, and reducing the risk of failure.

-- More Practical Signal Transmission and Power Distribution: Supports signal distribution, conversion, and amplification; can provide power to two-wire transmitters, resulting in simpler wiring.

--Meets explosion-proof and compliance requirements: Three-terminal isolation (input/output/power supply) makes it suitable for hazardous and explosion-proof environments, complying with industrial safety standards.

--Extends system lifespan: Reduces equipment stress and failures, lowers operational and maintenance costs, and enhances the stability and durability of the entire automation system.

IV. Key Specifications

4.1 Basic Electrical Specifications

- Input Signal Types: 4–20 mA, 0–20 mA, 0–10 mA, 0–5 V, 1–5 V, 0–10 V
- Output Signal Types: 4–20 mA, 0–20 mA, 0–10 mA, 0–5 V, 1–5 V, 0–10 V
- Load Capacity: For current output, load resistance ≤ 500 Ω;
  For voltage output, load resistance ≥ 10 kΩ,
- Input Impedance: For current signals (4–20 mA, 0–20 mA, etc.), input impedance ≤ 50 Ω;
  For voltage signals (0-5V/0-10V, etc.), input impedance ≥ 300 kΩ,
- Accuracy class: ±0.1% F.S. (under standard conditions of 25°C ± 2°C)

4.2 Isolation Performance Parameters

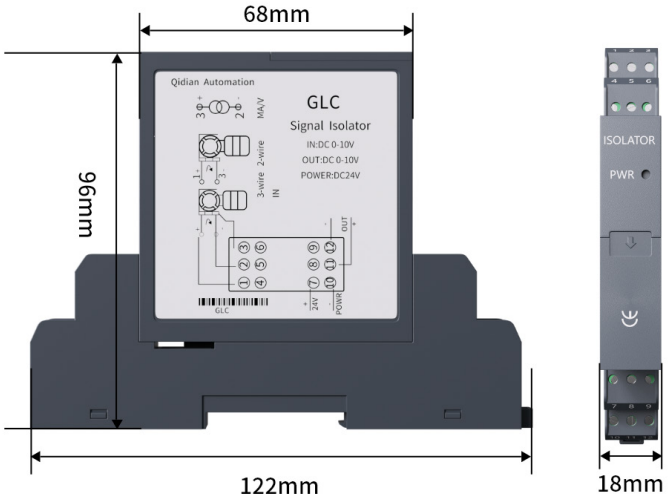
- Dielectric strength: Between the input, output, and power supply terminals, dielectric strength ≥ 1500 V AC/1 min
- Insulation resistance: Between input, output, and power supply terminals, insulation resistance ≥ 100 MΩ
- Electromagnetic compatibility standards: Complies with IEC 61326-3 and is also compatible with GB/T 18268 (equivalent to IEC 61326-1)
- Response time: ≤ 10 ms (typical value, 0%–90% response), with a minimum of ≤ 100 ms
- Temperature drift: 0.005% F.S./°C (within the -20°C to +55°C operating temperature range); 40 ppm/°C for certain models

4.3 Power Supply & Power Consumption Parameters

- Supply Voltage: Input range 18–32 V DC, typical value 24 V DC, ±10% voltage fluctuation allowed
- Full-Load Power Consumption: 24 V DC supply, power consumption ≤1.5 W;

4.4 Environmental Adaptation Parameters

- Operating Temperature and Humidity: Operating temperature -20°C to +60°C; some models support -20°C to +55°C; operating relative humidity 10% RH to 90% RH (at 40°C), non-condensing
- Storage Temperature and Humidity: Storage temperature -40°C to +80°C; storage relative humidity 10% RH to 95% RH, non-condensing



Mounting Method: 35mm DIN Rail
Dimensions: 122mm x 96mm x 18mm
Indicator Lights: PWR - Power / ALM - Alarm

V. Selection Guide

5.1 Key Selection Criteria

- Signal Type: This is a fundamental requirement. The input signals from on-site sensors/transmitters (e.g., 4–20 mA, 0–10 V) must precisely match the output signal requirements of the PLC/DCS to prevent transmission failures caused by signal incompatibility. Additionally, determine whether signal conversion is needed to accommodate different instrument interface requirements.
- Number of Channels: Select based on on-site signal transmission requirements. Standard configurations include 1-in-1-out (single-channel transmission, suitable for simple applications), 1-in-2-out/1-in-3-out (single input, multiple outputs, suitable for scenarios requiring simultaneous signal transmission to multiple PLCs/DCSs), and 2-in-2-out (dual independent signal transmission with no crosstalk). Choose flexibly based on the number of on-site devices.

- Power Supply: Prioritize compatibility with the existing on-site power system. The Qidian GLC signal isolator defaults to 24V DC power supply (suitable for standard industrial power scenarios) and supports a wide voltage range of 18–32V DC, eliminating the need for additional power line modifications. Custom power supply options are available for special scenarios to accommodate on-site wiring requirements.
- Explosion-proof requirements: Pay close attention to hazardous environments, such as chemical and metallurgical facilities where flammable or explosive gases/dust are present. Select models with explosion-proof certification (compliant with industrial safety standards) to ensure compliance with on-site regulations and eliminate safety hazards. For standard applications without explosion-proof requirements, the general-purpose model is sufficient.
- Installation Environment: Select models based on on-site environmental conditions such as temperature, humidity, dust, and vibration. For high-temperature or low-temperature environments (e.g., metallurgical workshops or outdoor cold conditions), choose models with wide temperature ranges (-20°C to +60°C). In high-dust or light-splash environments, prioritize the protection rating to ensure long-term stable operation and reduce maintenance costs.

5.2 Common Selection Misconceptions
- Misconception 1: Ignoring Isolation Level: Focusing solely on signal type while neglecting the isolation capability of the input, output, and power supply terminals can lead to ground loop interference and high-voltage intrusion, potentially burning out PLC/DCS ports. In high-voltage environments such as power generation and chemical plants, insufficient isolation levels pose serious safety hazards and violate industrial safety standards.
- Pitfall 2: Incorrect Signal Range Selection: Mistakenly selecting a 4-20mA model for a 0-10V signal, or failing to verify the signal range, results in improper signal transmission and data distortion or fluctuations. This fails to meet industrial-grade precision control requirements and necessitates model replacement later, increasing installation costs.
- Misconception 3: Neglecting load matching: Failing to verify the isolator's load capacity against the on-site instrument's load. For example, if the load resistance exceeds 500Ω for current output or falls below 10KΩ for voltage output, this causes signal attenuation, unstable transmission, or even equipment malfunction, thereby affecting system operational continuity.
- Misconception 4: Selecting General-Purpose Models for Explosion-Proof Environments: In hazardous environments such as chemical and metallurgical facilities, failing to select explosion-proof certified models and instead using general-purpose ones violates on-site safety compliance requirements. This poses a risk of fire and explosion and may result in the equipment failing safety inspections, thereby affecting production schedules.
- Misconception 5: Neglecting Environmental Adaptability: Blindly selecting general-purpose products without considering extreme on-site conditions such as high temperatures, high humidity, and high dust levels can cause the equipment to experience reduced accuracy, signal drift, or even complete failure in harsh environments, creating potential bottlenecks in production continuity.

5.3 Customization Recommendations
For requirements that standard models cannot meet—such as special on-site signals, non-standard operating conditions, and multi-channel integration—Qidianjia offers dedicated customization services. We provide one-on-one technical support throughout the entire process to ensure that the customized solution aligns with on-site realities while balancing stability, compliance, and practicality. We also provide full-lifecycle technical support.
- Customization for Special Signals: For non-standard analog signals (e.g., 0–25 mA, 0–15 V), thermocouple/RTD signals, or scenarios requiring special signal conversion (e.g., current-to-voltage or voltage-to-current), we can customize signal adaptation modules to ensure precise signal transmission and compatibility with on-site sensors and controllers.
- Customization for Non-Standard Operating Conditions: For non-standard environments such as extreme high and low temperatures (e.g., -40°C to +80°C), severe vibration, high corrosion, or high explosion-proof ratings (exceeding standard explosion-proof requirements), we can develop dedicated models tailored to specific protection, temperature drift, and isolation requirements. These models utilize high-quality components and optimized circuit layouts to ensure long-term, stable operation.
- Multi-Channel Integration Customization: To address on-site requirements for centralized transmission of multiple sensors and signals, we offer customizable multi-channel integration modules (e.g., 4-in/4-out, 8-in/8-out). These modules enable independent isolation and synchronous transmission of multiple signals, reducing the number of devices, simplifying on-site wiring, minimizing control cabinet space requirements, and lowering operational and maintenance costs—ideal for smart manufacturing scenarios involving multi-device coordination.
- Customization Service Guidelines: To request customization, please provide detailed on-site operating conditions (signal types, number of channels, power supply method, environmental parameters, explosion-proof rating, etc.). Qidianjia's technical team will respond within 24 hours to provide a customized solution and quotation, along with installation and commissioning guidance and after-sales support, ensuring the customized product quickly meets on-site requirements.

VI. Installation and Commissioning Guidelines
This section focuses on practical on-site installation and commissioning procedures, providing step-by-step guidance on the installation process. It clarifies operational standards, safety precautions, and methods for avoiding common issues to reduce the incidence of installation failures, ensure rapid commissioning of the equipment, and extend its service life.
6.1 Pre-installation Preparation
1. Checking Accessories
After unpacking, verify the completeness of each component to ensure nothing is missing or damaged. Key components include: the Qidian GLC Signal Isolator main unit, mounting clips (compatible with 35mm standard DIN rails), product manual (including wiring diagrams), terminal label stickers, and mounting screws. For explosion-proof models, additionally verify that explosion-proof seals and explosion-proof certification are complete to ensure compliance with on-site explosion-proof requirements.
2. Environmental Inspection
Confirm that the installation environment meets the product's compatibility requirements to prevent future failures caused by environmental factors:
- Temperature and Humidity: Must fall within the product's operating range (-20°C to +60°C, relative humidity 10%RH to 90%RH, non-condensing). In high-temperature environments, adequate heat dissipation measures must be implemented; in humid environments, moisture-proof devices must be installed.
- Interference Prevention: The installation location must be kept at least 30 cm away from strong sources of electromagnetic interference, such as variable frequency drives, motors, and high-voltage cables, to prevent interference with signal transmission. In explosion-proof environments, verify that the explosion-proof rating of the installation area matches the product's explosion-proof certification.
- Installation Space: When installing inside a control cabinet, ensure at least 5 cm of clearance is left for heat dissipation. Avoid stacking the unit too closely with other equipment to facilitate future debugging, maintenance, and heat dissipation.
3. Tool List
Essential Tools: Wire strippers (for 0.5–2.5 mm² wires), screwdrivers (Phillips/flathead, for terminal screws), multimeter (for testing voltage and current signals), crimping pliers (for securing wire terminals), cable ties (for organizing wiring), electrical tape (for insulation); In explosion-proof environments, additional explosion-proof tools must be prepared to prevent sparks during installation.
4. Safety Precautions
- Before installation, the main power supply and signal sources at the site must be disconnected. Confirm that there is no voltage or signal before proceeding to eliminate the risk of electric shock or signal short circuits.
- When working in explosion-proof environments, it is strictly prohibited to bring flammable or explosive items. Tools must comply with explosion-proof standards to prevent static electricity and sparks. Seal explosion-proof connections promptly after installation.
- Operators must wear insulated gloves and non-slip shoes to avoid direct contact with terminals and wires, preventing electric shock or wire damage.
- Wires, terminals, and other components must comply with industrial standards. The use of damaged or aged wires is strictly prohibited to prevent signal abnormalities caused by poor contact.

6.2 Standard Installation Steps
1. Mounting the Rail
Install using a standard 35mm rail. The steps are as follows: □ Secure the mounting clips into the slots at the bottom of the isolator, ensuring they are firmly locked in place with no looseness;

② Align the isolator with the 35mm rail inside the control cabinet, slide it onto the rail from top to bottom, and gently press until the clips are fully engaged. Confirm that the isolator does not wobble and is securely fixed;
③ If multiple devices are to be installed side-by-side, maintain a spacing of at least 5 cm between adjacent devices to allow for heat dissipation and operational space.

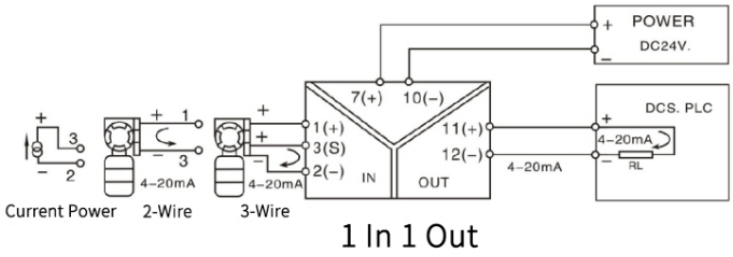
2. Grounding Requirements

Grounding is critical for suppressing interference and ensuring equipment safety. Strictly adhere to the following requirements:

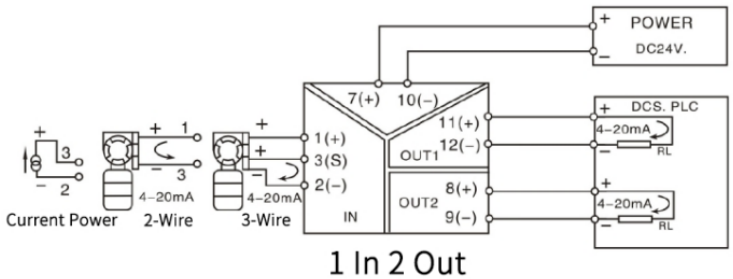
- The isolator housing is equipped with a grounding terminal (marked “PE”). Connect it to the dedicated on-site grounding busbar using a grounding wire (with a cross-sectional area of at least 1.5 mm²). The grounding resistance must be ≤4 Ω to ensure reliable grounding.
- Signal Shielding Wire Handling: The signal shielding wire of the sensor/transmitter must be grounded at a single end—only on the isolator’s input side. The shielding wire on the output side must not be grounded to avoid ground loop interference. The shielding layer must be stripped cleanly and must not come into contact with terminals or conductors to prevent short circuits.
- Grounding in Explosion-Proof Environments: Explosion-proof grounding terminals must be used. The grounding wire must pass through explosion-proof seals to ensure a secure connection and comply with on-site explosion-proof grounding regulations, thereby eliminating safety hazards caused by poor grounding.

6.3 Wiring Diagram

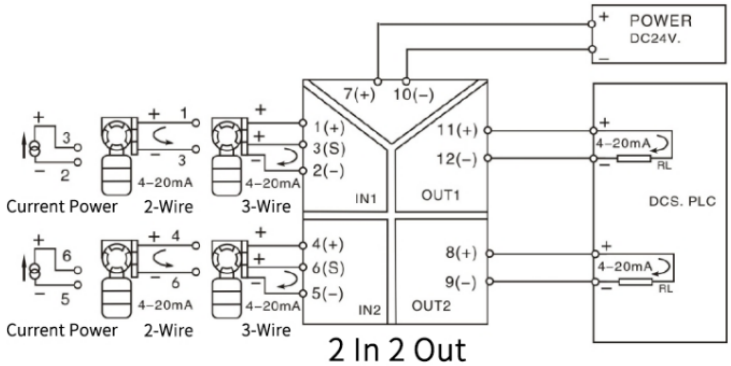
The following is the standard wiring diagram for the GLC, clearly labeling positive and negative terminals, terminal numbers, shielding wire handling, and specific wiring specifications. It includes a comparison of common correct and incorrect wiring practices to facilitate quick reference by on-site installation personnel.



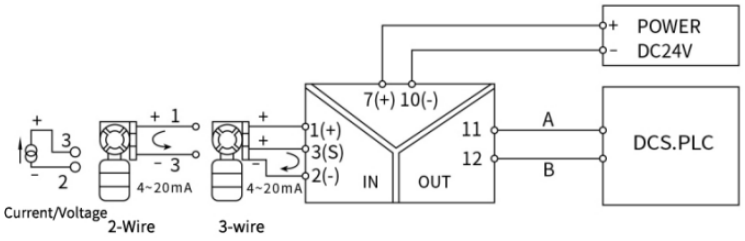
1 In 1 Out

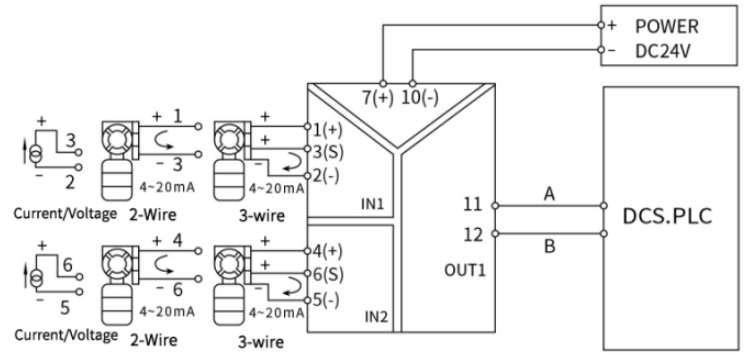


1 In 2 Out



2 In 2 Out





6.4 Power-On Commissioning Procedure

After completing the wiring and verifying that everything is correct, perform the commissioning step by step in the following order: “No-Load Test → Signal Verification → Indicator Light Check → Accuracy Calibration.” Proceed to the next step only after confirming that each step is normal.

1. No-Load Test (Verify power supply and basic device status)

- Connect the on-site power supply and verify that the supply voltage is 24 V DC (tolerance ±10%). Observe the status of the isolator’s indicator lights (normal status: power light is constantly on; no fault lights are illuminated).
- In the no-load state, use a multimeter to test the output terminals. When there is no signal input, the output signal should remain stable at 4 mA (current signal) or 0 V (voltage signal), with no fluctuations or drift, indicating that the device’s power supply section is functioning normally.
- If the power indicator is off, check the power connections and verify that the voltage is normal; if the fault indicator is on, check for short circuits or reversed wiring.

2. Signal Calibration

- Connect a sensor/transmitter and provide a standard input signal (e.g., 4 mA, 12 mA, 20 mA current signal, or 0 V, 5 V, 10 V voltage signal).
- Use a multimeter to test the isolator’s output terminals and confirm that the output signal matches the input signal, with an error within ±0.1% F.S. (in accordance with the product’s accuracy grade).
- Simulate changes in the field signal (e.g., adjust the sensor output from 4 mA to 20 mA in steps) and observe whether the output signal changes synchronously, with no delay or distortion; this indicates normal signal transmission.

3. Interpreting Indicator Light Status

The indicator lights on the Qidian GLC signal isolator are clearly labeled, allowing for quick assessment of device status and troubleshooting of common issues:

- Power Indicator (Green): Steady → Power is normal; Off → Incorrect power connection, abnormal voltage, or device malfunction.
- Signal Indicator (Yellow): Steady → Signal input/output present; Flashing → Signal abnormality, interference, or poor wiring; Off → No signal input/output; check the sensor or wiring.
- Fault Indicator (Red): Steady → Internal device fault, overvoltage, or short circuit; Flashing → Poor sealing in explosion-proof models or environmental conditions exceeding limits; shut down the system for troubleshooting.

4. Accuracy Calibration Procedure

If the error exceeds the permissible range during signal verification, accuracy calibration can be performed. Follow these steps (to be performed by qualified personnel):

- Connect a standard signal source, set the input signal to 4 mA (current signal) or 0 V (voltage signal), and use a multimeter to measure the output signal. Use the “Zero Calibration” knob on the side of the isolator to adjust the output signal to 4 mA or 0 V.
- Adjust the input signal to 20 mA (current signal) or 10 V (voltage signal). Use a multimeter to measure the output signal, and use the “Full-Scale Calibration” knob to adjust until the output signal reads 20 mA or 10 V.
- Repeat the calibration 2–3 times to confirm that the input and output signal errors are within ±0.1% F.S. After calibration is complete, tighten the calibration knobs and document the calibration results.

6.5 Installation Precautions
- Precaution 1: Never exceed the rated supply voltage: The supply voltage must not exceed the range of 18–32 V DC. Never connect to an AC power source or high-voltage DC power source, as this will directly burn out the internal circuitry and may even pose a safety hazard. Before powering on, use a multimeter to verify that the voltage meets the requirements.
- Prohibition 2: Avoid High-Voltage Interference: It is strictly prohibited to install the isolator near sources of strong electromagnetic interference, such as variable frequency drives, motors, or high-voltage cables (a minimum distance of 30 cm must be maintained). It is strictly prohibited to route signal wires in the same conduit as high-voltage power lines (220V AC or higher) to prevent interference with signal transmission, which can cause signal drift or distortion.
- Taboo 3: Inadequate Protection in Humid Environments: Failure to install moisture-proof devices in humid or condensation-prone environments, or failure to properly insulate terminal blocks, can cause equipment short circuits, reduced insulation performance, or even electrical leakage. In humid environments, regularly inspect the equipment's condition and promptly clean condensation and dust from terminal surfaces.
- Taboo 4: Wiring errors or poor connections: It is strictly prohibited to reverse the polarity or short-circuit power, input, or output terminals; it is also strictly prohibited to have excessively long exposed wires or loose connections. After wiring is complete, each connection must be verified individually to prevent signal abnormalities, equipment damage, and difficulties in troubleshooting faults later on.
- Taboo 5: Improper Operation in Explosion-Proof Environments: Failing to wire or seal explosion-proof models in accordance with explosion-proof standards, or using non-explosion-proof tools during installation, will compromise explosion-proof performance and create flammable or explosive risks. After installation in explosion-proof environments, inspect the seals to ensure compliance with on-site explosion-proof requirements.
- Taboo 6: Neglecting Heat Dissipation and Maintenance: It is strictly prohibited to stack multiple devices in close proximity without allowing sufficient space for heat dissipation, as this can cause equipment overheating, reducing accuracy and service life. Subsequently, equipment surfaces must be cleaned of dust regularly, and terminal connections must be checked for looseness to promptly identify and address potential faults.

VII. Recommendations for Daily Use and Maintenance
This section focuses on the daily operation and long-term maintenance of the equipment. It outlines specific requirements for inspections, maintenance, and servicing, and provides methods for parameter backup and adjustment. These guidelines help users reduce equipment failure rates, extend the service life of the equipment, ensure the long-term stable operation of the signal isolators, and safeguard the continuity of industrial automation systems.

7.1 Key Points for Daily Inspections (Daily/Weekly)
- Indicator Light Inspection: During daily inspections, pay close attention to the status of the isolator's indicator lights. Ensure that the power light (green) remains steady, the signal light (yellow) remains steady (when there is signal input/output), and the fault light (red) does not illuminate. If any indicator lights flash, go out, or display abnormal colors, immediately shut down the system for troubleshooting. Refer to the indicator light diagnosis methods in Module 5 to identify the cause of the fault (e.g., power supply issues, poor wiring, signal interference, etc.). .
- Signal Stability Monitoring: Monitor the stability of the isolator's input/output signals weekly using a PLC, DCS system, or multimeter. Verify that signals show no significant fluctuations or drift, and that errors are controlled within ±0.1% F.S. If signal abnormalities occur, prioritize troubleshooting sensors, terminal blocks, and interference sources to prevent signal distortion from affecting production control.
- Temperature and Humidity Monitoring: Record the temperature and humidity inside the control cabinet daily to ensure the ambient temperature remains between -20°C and +60°C, and relative humidity between 10% RH and 90% RH (no condensation). If ambient temperature or humidity exceeds the specified range, promptly activate cooling and dehumidification equipment (such as cooling fans or dehumidifiers) to prevent issues such as reduced accuracy or degraded insulation performance caused by excessive temperature or humidity.

7.2 Regular Maintenance Plan (Performed on a Scheduled Basis)
- Cleaning Frequency and Methods: Clean the isolator once a month, focusing on removing dust and debris from the equipment surface, terminals, and inside the control cabinet. Before cleaning, disconnect the power supply and use a dry, soft-bristled brush or compressed air (low pressure) to blow away dust. Never use wet cloths, alcohol, or other corrosive cleaning agents to avoid damaging the equipment housing and internal circuits. For explosion-proof models, re-inspect the seals after cleaning to ensure explosion-proof performance.
- Wiring Tightness Inspection: Conduct a tightening inspection of the isolator's power, input, and output terminals, as well as grounding wires, once every quarter. Check for loose terminal screws or poor wire contact. In environments with significant vibration, such as metallurgical settings, shorten the inspection cycle to once a month. Apply moderate force when tightening to avoid damaging terminals or wires; ensure all connections are secure and free of loose joints.
- Recommendations for Accuracy Retesting: Conduct an accuracy retest on the isolator every six months. Use a standard signal source for input and a multimeter to measure the output signal, confirming that the error meets the accuracy requirement of ±0.1% F.S. If the error exceeds this range, calibrate the device according to the calibration method in Module 5. After calibration, document the results and retain the calibration report for future traceability.

7.3 Long-Term Maintenance Tips
- Dust and Moisture Protection: Place desiccant inside the control cabinet and replace it regularly (every 3 months) to prevent condensation from damaging the equipment. In high-dust environments (such as metallurgy or mining), install a dust cover on the control cabinet and clean the filter mesh regularly. Avoid installing the isolator near water sources or in damp areas; if unavoidable, install waterproof sealing devices to prevent short circuits and insulation damage.
- Interference Mitigation: Regularly check the clearance between the isolator and the variable frequency drive (VFD), motor, and high-voltage cables to ensure a minimum distance of 30 cm, thereby avoiding strong electromagnetic interference; route signal wires separately from power lines (220 V AC and above), maintaining a minimum distance of 10 cm; use shielded cables for signal lines and ensure reliable single-point grounding of the shield; If on-site interference is severe, install a surge protector at the isolator's input to further enhance interference resistance.
- Protection Against Extreme Environments: In high-temperature environments (e.g., metallurgical workshops), install heat sinks or cooling fans on the isolator to ensure proper heat dissipation and prevent overheating; in low-temperature environments (e.g., outdoor cold conditions), install insulation on the control cabinet to prevent startup difficulties and reduced accuracy caused by low temperatures; in high-vibration environments, install anti-vibration mounts on the isolator to minimize damage to internal components caused by vibration and extend the equipment's service life.