QD-10 Current Transducer

I. Product Definition

The Qidian QD-10 Blue-Housed Three-Terminal Isolated Hall-Effect AC/DC Current Transmitter is a high-precision current signal acquisition and isolation conversion module developed by Anhui Qidian Automation specifically for industrial automation, power monitoring, and process control applications. Its core functions and features are as follows:

1. Wide-range current signal acquisition and conversion
It can acquire AC current signals within the 0–100 A range (custom DC 0–100 A specifications are available to accommodate both AC and DC applications), linearly converting high-current signals from the high-voltage side into standard industrial analog output signals (default DC 4–20 mA; custom voltage signals such as 0–5 V or 0–10 V are supported), thereby enabling signal compatibility between high-voltage and low-voltage systems.
2. Three-Point Full Electrical Isolation Protection
Achieves complete electrical isolation across three circuits: the input circuit (high-voltage current side), the output circuit (low-voltage signal side), and the power supply circuit (24V DC supply side). With an isolation withstand voltage of ≥2500V AC/1 min, it effectively blocks the impact of ground loops, common-mode interference, and surge impacts on downstream low-voltage equipment such as PLCs and DCS systems, preventing equipment damage and system malfunctions at the source.
3. Hall-Effect Non-Contact Measurement
Utilizes the open-loop Hall-effect current sensing principle, eliminating the need for direct series connection to the circuit under test. Current is captured simply by passing the cable through the transmitter's ring-shaped opening, preserving the original circuit structure. Suitable for current monitoring scenarios involving single-core or multi-core cables, it offers convenient installation without electrical connection risks.
4. Industrial-Grade Interference Immunity and Wide Temperature Range
Features a blue, industrial-grade, flame-retardant ABS housing with dustproof, corrosion-resistant, and impact-resistant properties; incorporates built-in EMC interference suppression circuitry to withstand electromagnetic interference in industrial environments; supports a wide operating temperature range of -20°C to +60°C, making it suitable for complex conditions such as factory workshops and outdoor cabinets.
5. Standard Industrial Power Supply and Installation
Utilizes a 24V DC industrial standard power supply, compatible with the vast majority of industrial control systems; features a standard 35mm DIN rail mounting design, conforming to standardized installation specifications for industrial control cabinets; incorporates green screw terminal blocks for secure and reliable wiring, facilitating on-site cabling and maintenance.
6. High-Precision Linear Output
Equipped with high-precision Hall sensors and signal conditioning circuits, the linearity error is ≤0.5% and the response time is ≤100 ms. It provides real-time feedback on dynamic changes in the measured current, meeting the high-precision data acquisition requirements for industrial process control, energy consumption monitoring, motor protection, and other applications.
7. LED Status Indicators (Optional Configuration)
Select models offer optional power/fault indicator lights, which visually display power supply status and device operating status, facilitating rapid on-site troubleshooting of equipment faults.

II. Working Principle

Core Principles: Hall Effect + Three-Terminal Electrical Isolation + Signal Linear Conversion
1. Non-contact Current Sensing (Hall Effect Circuit)
The cable carrying the current to be measured passes through the transmitter's annular opening, and the current in the cable generates an annular magnetic field around it. The Hall element inside the transmitter (located in the air gap of the ring-shaped magnetic circuit) detects this magnetic field. According to the Hall effect, the magnetic field generates a weak voltage signal (Hall voltage) on the Hall element that is proportional to the magnitude of the measured current, thereby achieving a non-contact conversion from current to magnetic field to electrical signal. Throughout this process, there is no direct electrical connection with the measured circuit.
2. Signal Conditioning and Calibration Stage
The weak voltage signal output by the Hall element is amplified, filtered, temperature-compensated, and linearly corrected by an internal high-precision operational amplifier. This process eliminates temperature drift, nonlinear errors, and high-frequency interference, resulting in a standard electrical signal that is strictly linearly proportional to the magnitude of the measured current.
3. Three-Port Electrical Isolation Stage
The conditioned signal passes through a magnetic isolation module to achieve electrical isolation from both the input side and the power supply side: high-voltage interference and ground potential differences on the input side cannot be transmitted to the output or power supply sides, and power supply fluctuations on the power supply side will not affect the signal stability of the input or output sides. This achieves complete electrical isolation between the input, output, and power supply sides, effectively blocking interference pathways.
4. Standard Industrial Signal Output Stage
The isolated signal passes through a D/A converter and driver circuit to be converted into the standard industrial signal required by the user (e.g., 4–20 mA DC): When the measured current is 0 A, a 4 mA signal is output; when the measured current reaches full scale (e.g., 100 A), a 20 mA signal is output; intermediate current values have a linear relationship with the output signal and can be directly read and processed by downstream PLCs, digital displays, and industrial PCs.

Summary of the Workflow
The measured current generates a magnetic field → The Hall element detects the magnetic field and outputs a weak electrical signal → The signal is amplified, filtered, temperature-compensated, and linearly calibrated → Three-terminal electrical isolation is applied → The signal is converted into a standard industrial signal for output. The entire process achieves non-contact data acquisition, electrical isolation, and high-precision linear conversion.

III. Core Value and Solutions to Pain Points

1. Overview of Core Value
Solves the challenge of isolating high- and low-voltage signals in industrial environments, protecting downstream precision control equipment from high-voltage surges and interference;
Enables non-contact current acquisition without modifying existing circuits, ensuring easy installation and eliminating safety hazards;
Provides standard industrial signal output compatible with mainstream industrial control equipment, reducing system integration complexity and costs;
Delivers high-precision, high-stability current monitoring, providing reliable data support for energy management, equipment protection, and process control;
Industrial-grade anti-interference and wide-temperature design adapt to complex industrial environments, enhancing long-term system reliability;
Standardized installation and wiring design fits industrial control cabinet scenarios, facilitating on-site installation and future maintenance.

Challenges and Solutions
Challenge: Ground potential differences and common-mode interference in high-voltage circuits at industrial sites often cause PLCs and digital displays to malfunction or even fail. What can be done?
Answer: The QD-10 employs a three-terminal fully electrical isolation design, with complete isolation between the input, output, and power supply sides. With an isolation withstand voltage of ≥2500 V AC/1 min, it blocks the transmission of ground loops, common-mode interference, and surge impacts, effectively protecting downstream low-voltage equipment and preventing equipment damage and system malfunctions caused by high-voltage interference.

Question: Traditional current transformers require series connection to the circuit, which involves high costs and significant risks when retrofitting existing circuits, and can easily disrupt normal equipment operation. Is there a more convenient method for data acquisition?
Answer: The QD-10 utilizes a Hall-effect non-contact measurement principle. Current acquisition is achieved simply by passing the cable through the transmitter's ring-shaped opening, eliminating the need for series connection to the circuit. This approach preserves the original wiring structure, offers convenient installation, and eliminates electrical connection risks, making it suitable for retrofitting and upgrading various

existing production equipment.

Question: Different brands of PLCs and industrial PCs have varying input requirements for current signals. How can we ensure that the acquired current signals are compatible with all mainstream devices?
A: The QD-10 converts the measured current into an industry-standard signal (default: 4–20 mA DC; customizable voltage signals such as 0–5 V or 0–10 V are supported). Virtually all PLCs, DCS systems, and digital display instruments support this standard signal input, eliminating the need for additional conversion modules and reducing system integration complexity and costs.

Question: Industrial field environments are complex; temperature fluctuations and electromagnetic interference can cause significant measurement errors and signal instability, making it impossible to meet control and monitoring requirements. What should be done?
Answer: The QD-10 features built-in high-precision Hall sensors and signal conditioning circuits, with a linearity error of ≤0.5% and a response time of ≤100 ms. It also incorporates an industrial-grade blue ABS housing and EMC anti-interference design, supporting a wide operating temperature range of -20°C to +60°C. This enables it to withstand electromagnetic interference in industrial environments, ensuring the accuracy and stability of measurement data under complex operating conditions.

Question: Space inside industrial control cabinets is limited. Traditional current transmitters are cumbersome to install and result in messy wiring, which affects the cabinet's tidiness and maintenance efficiency. Is there a suitable installation method?
Answer: The QD-10 features a standard 35mm DIN rail mounting design that snaps directly onto the control cabinet's rails, ensuring convenient installation and secure mounting; It features green screw-type terminal blocks, ensuring neat and standardized wiring that facilitates future maintenance and repairs, meeting the standardized installation requirements of industrial control cabinets.

Question: Industrial equipment experiences wide fluctuations in current. Traditional measurement devices cannot provide real-time feedback on current changes, making it difficult to accurately track energy consumption and implement equipment overload protection. What is the solution?
Answer: The QD-10 supports wide-range AC/DC current acquisition from 0 to 100A. Its output signal maintains a strict linear relationship with the measured current and features a fast response time, enabling real-time feedback of dynamic current changes. This provides precise, real-time data support for scenarios such as energy consumption tracking, motor overload protection, and inverter current monitoring.

Question: On-site equipment requires both AC and DC current monitoring, necessitating the purchase of two different transmitter models, which increases procurement and management costs. What should be done?
Answer: The QD-10 supports AC and DC current acquisition (AC or DC specifications can be customized as needed). A single device can accommodate both AC and DC current monitoring scenarios, reducing the variety of models purchased and lowering inventory and management costs.

Question: On-site equipment has unstable power supplies and is prone to voltage fluctuations. Will this affect the transmitter's normal operation and measurement accuracy?
Answer: The QD-10 uses a standard 24V DC industrial power supply and features built-in surge protection and voltage regulation circuits. It supports a wide input voltage range, effectively mitigating the impact of on-site power fluctuations to ensure stable operation and measurement accuracy.

IV. Key Product Specifications
4.1. Basic Electrical Specifications
Product Model: QD-10 Hall-Effect AC/DC Current Transmitter (Blue Housing)
Signal Type: Universal measurement of AC and DC current
Input Range (Standard): AC/DC 0–50 A, 0–100 A (multi-range options available upon request)
Output Standard Signals:
Current Type: DC 4–20 mA (Standard)
Voltage Type: DC 0–5 V, 0–10 V (Customizable)
Measurement Accuracy: ≤±0.5% FS
Linearity: ≤0.2% FS
Response Time: ≤100 ms
Load Capacity:
Current Output: Maximum load resistance ≤500Ω
Voltage Output: Minimum load resistance ≥10kΩ
Frequency Response: DC–50Hz (Universal for power frequency)
Signal Ripple: ≤10mV
Zero Drift: ≤0.2% FS/year
Temperature Coefficient: ≤50ppm/°C

4.2 Isolation Performance Parameters
Isolation Architecture: Three-terminal full isolation (input, output, and power supply sides are mutually isolated)
Power-frequency Isolation Withstand Voltage: Input ↔ Output, Input ↔ Power Supply, Output ↔ Power Supply: 2500 V AC / 1 min, no breakdown, no creepage
Insulation Resistance: ≥1000 MΩ between isolated circuits (tested at 500 V DC)
Common-Mode Rejection Ratio (CMRR): ≥80 dB
Interference Immunity: Complies with industrial EMC standards, effectively suppressing common-mode interference, ground-loop interference, and high-frequency pulse interference
Isolation Transmission Method: Electromagnetic isolation coupling, lossless linear signal transmission

4.3. Power Supply & Power Consumption Parameters
Standard Supply Voltage: DC 24V (typical industrial voltage)
Permissible Supply Range: DC 18V–30V (wide-voltage compatibility)
Full-Load Power Consumption: ≤1.8W
Standby Power Consumption: ≤0.8W
Power Protection: Built-in reverse polarity protection, overvoltage protection, and surge suppression circuitry
No external power output; pure signal conversion and isolation design; no additional power distribution load required

4.4 Environmental Adaptation Parameters
Normal Operating Temperature: -20°C to +60°C
Extreme Operating Temperature: -25°C to +70°C (short-term conditions)
Storage Temperature: -40°C to +85°C
Operating Humidity: 10% RH to 90% RH, no condensation or frost
Storage Humidity: 5% RH to 95% RH, no condensation
Enclosure Protection Rating: IP30 (for indoor control cabinets only; dust-proof and protected against solid foreign objects)
Explosion-Proof Rating: Standard industrial non-explosion-proof type; not suitable for high-risk explosion-hazard zones
Safety Barrier Compatibility: Intrinsically safe design; no safety barrier required; suitable for direct use in standard industrial control room environments

4.5. Physical Specifications
Mounting Method: Standard 35mm DIN rail snap-on mounting, compatible with general-purpose electrical control cabinets
Housing Appearance: Qidian custom blue flame-retardant engineering ABS housing
Dimensions (L × W × H): 120mm × 64mm × 24mm
Net Weight: Approx. 125g
Indicator Light Definitions:
PWR Power Indicator: Green steady light = Normal power supply; Off = Power disconnected / Power supply abnormality
ALM Alarm Indicator: Off under normal conditions; On / Flashing = Signal out of range, circuit fault, or sampling anomaly
Housing Material: High-strength flame-retardant ABS plastic, featuring high-temperature resistance, anti-aging properties, corrosion resistance, and excellent insulation
Structural Details: One-piece sealed housing, terminal blocks with anti-loosening screws, built-in insulating partitions, and a layout separating high-voltage and low-voltage circuits to enhance overall insulation and safety performance

V. Scenario-Based Selection Guide

This guide addresses common issues such as customers struggling to select the right product, parameter mismatches, incorrect model selection, and mismatched operating conditions. By leveraging the product features of the Qidian QD-10 blue-cased, three-terminal isolated Hall-effect AC/DC current transmitter, it provides a comprehensive, scenario-based selection guide. The guide is presented entirely in text format with item-by-item listings, making it ideal for quick reference by beginners and engineering procurement professionals.

5.1 Key Selection Criteria

1. Signal Type Selection: First, determine whether the current measured on-site is AC or DC. The QD-10 features a universal AC/DC Hall-effect measurement architecture, compatible with both standard power-frequency AC and industrial DC load currents. Simply select the appropriate input range based on the actual maximum operating current. Additionally, verify the type of current or voltage signal output required by the downstream receiving device, and choose between the standard 4–20 mA current output or 0–5 V/0–10 V voltage output specifications as needed.

2. Channel Selection: The Qidian QD-10 features a standard single-channel design with a fixed 1-in-1-out configuration. A single unit handles the acquisition, isolation, and conversion of one current signal. For single-loop monitoring, the standard model is sufficient; for scenarios requiring simultaneous monitoring of multiple loops, multiple QD-10 transmitters must be configured independently based on the number of loops, as there is no integrated multi-channel model available.

3. Power Supply Selection: The device comes standard with a universal industrial 24V DC power supply, compatible with the centralized power supply environments of most control cabinets, PLCs, and switching power supplies. In field conditions where only AC power is available and there is no DC distribution, a dedicated DC switching power supply must be used for conversion; the device cannot be directly connected to high-voltage AC power.

4. Selection Based on Explosion-Proof Requirements: The standard QD-10 model with a blue housing is a general-purpose industrial version. It lacks explosion-proof certification and intrinsic safety design and is only suitable for ordinary non-explosion-proof workshops. In chemical explosion-proof zones, dust explosion-proof zones, or hazardous chemical environments involving flammable and explosive substances, the general-purpose model must not be used directly; specialized explosion-proof sensor equipment must be used instead.

5. Selection Based on Installation Environment: For standard conditions such as conventional indoor control cabinets, sealed electrical enclosures, and temperature-controlled workshops, the standard QD-10 with 35mm DIN rail mounting can be used directly; for environments with high temperature and humidity, high dust concentration, outdoor open-air settings, or strong corrosive gases, the environmental temperature and humidity range must be confirmed in advance to match the device's temperature resistance parameters, and external dust-proof, corrosion-resistant, and ventilation protection measures must be implemented.

6. Isolation Level Selection: In industrial control systems where ground potential differences, interference from multiple devices sharing a common ground, or mixed high- and low-voltage wiring exist, the QD-10 three-terminal isolated version must be strictly selected to ensure electrical isolation between the input, output, and power supply. For simple operating conditions with single, independent circuits and no risk of interference, choices can be made based on budget constraints; however, for complex industrial environments, the three-terminal isolated model is uniformly recommended as standard equipment.

5.2 Selection Guidelines for Industry Scenarios

1. In chemical production environments, where high- and low-voltage wiring is complex, electromagnetic interference is intense, and ground loop interference is prevalent, and where high stability in circuit monitoring is required, the Qidian QD-10 three-terminal isolated Hall-effect current transmitter is uniformly recommended for real-time AC/DC current acquisition and signal isolation transmission in reactors, transfer pumps, variable-frequency loads, and circulation units.

2. In the power industry, scenarios such as high- and low-voltage switchgear cabinets, auxiliary equipment in distribution rooms, low-voltage power circuits, UPS DC systems, and power monitoring for fans and pumps require high-precision current acquisition and electrical safety isolation. The QD-10 standard model with a blue housing is recommended for these applications, providing standard analog signals for power monitoring systems and energy consumption meters.

3. In the metallurgical industry, workshops are characterized by high-temperature environments, heavy loads from large motors, and a high concentration of variable-frequency equipment, resulting in a harsh electromagnetic environment and significant fluctuations in operating currents. The QD-10's wide temperature range and strong anti-interference performance meet the requirements for long-term continuous monitoring, making it suitable for current signal conversion in smelting auxiliary equipment, conveying machinery, and cooling systems.

4. In the pharmaceutical industry, cleanrooms, automated production lines, water treatment support equipment, and power circuits for purification systems demand high operational stability. In conventional pharmaceutical workshops without explosion-proof zones, the QD-10 isolated transmitter ensures stable signal transmission for automated control systems, preventing interference-induced malfunctions in low-voltage control equipment.

5. In the smart manufacturing industry—including automated production lines, robotic power circuits, variable-frequency equipment on assembly lines, and warehouse logistics conveying systems—the QD-10's rail-mounting capability and standard industrial signal output make it ideal for centralized installation in standardized control cabinets. It seamlessly integrates with smart manufacturing central control systems, PLC data acquisition, and equipment overload monitoring.

6. In the water treatment and environmental protection industries—including outdoor and cabinet-mixed installation scenarios such as sewage pumping stations, chemical dosing equipment, aeration blowers, and variable-frequency water pumps—the standard QD-10 is selected for conventional indoor cabinet installations to monitor equipment current consumption and collect remote operational status data.

5.3 Common Selection Pitfalls

1. Neglecting Isolation Levels: Most users focus solely on measurement range and output signals, overlooking three-terminal isolation configurations. In field environments where high- and low-voltage circuits share a common ground or where multiple devices are connected in parallel, this can easily lead to signal drift, data fluctuations, and burned-out PLC ports. Failure to select appropriate isolation is the most common cause of failures in industrial control environments.

2. Misjudging Signal Range Selection: Relying solely on the device's rated current for selection without considering inrush current during startup or short-term overload currents. Selecting a range that is too small results in long-term oversaturation and measurement distortion, while selecting a range that is too large leads to reduced measurement accuracy in low-current ranges and data acquisition errors exceeding tolerance limits.

3. Misconception of neglecting load matching: Failing to verify the load parameters of downstream instruments or PLC analog inputs. If the resistance of the downstream load for current-output transmitters exceeds the device's maximum load capacity, it will cause signal attenuation, abnormal output, and the inability to read current data normally.

4. Misapplication of General-Purpose Models in Explosion-Proof Environments: In flammable and explosive chemical facilities, dust-prone workshops, and oil and gas areas, arbitrarily selecting the standard QD-10 general-purpose transmitter violates on-site safety regulations, poses safety hazards, and constitutes a serious selection violation.

5. Confusion Between AC and DC Measurement Selection: Failing to distinguish between AC and DC load characteristics and blindly selecting a single-measurement model results in the inability to acquire data from DC loads and unstable AC signal measurements, thereby affecting the normal operation of the entire control system.

5.4 Customization Recommendations

1. Custom solutions for special signals: The standard output is 4–20 mA current. For older equipment or special instruments requiring non-standard voltage signals, we can customize non-standard voltage outputs of 0–1 V, 0–3 V, 0–5 V, or 0–10 V; For non-standard current ranges (both low and high), we can customize non-standard input ranges such as 0–10 A, 0–200 A, and 0–300 A to meet the monitoring needs of niche equipment.

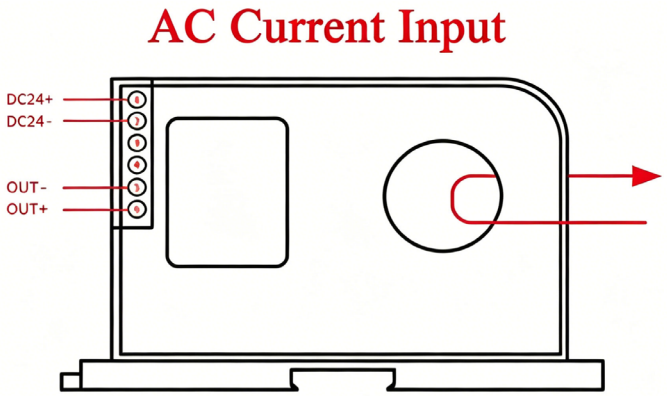
2. Custom Solutions for Non-Standard Operating Conditions: For special operating conditions involving high temperatures, high humidity, or strong corrosion, we can customize enhanced anti-corrosion housing coatings and extended temperature range versions; For sites with strong electromagnetic pulse interference, enhanced EMC anti-interference

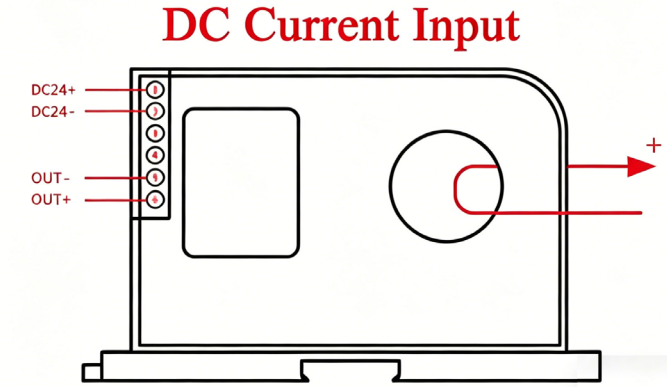
circuits can be upgraded to improve equipment operational stability and measurement accuracy in complex and harsh environments.
3. Customized Multi-Circuit Solutions: For scenarios requiring centralized monitoring of multiple circuits where no all-in-one multi-channel models are available, we offer customized solutions featuring uniform parameter settings, standardized wiring definitions, and consistent dimensional specifications across the entire batch of equipment. This facilitates unified cabling within enclosures and streamlined bulk installation and commissioning. Additionally, we provide customized labels and bulk technical documentation to support standardized project implementation.
4. Customized Solutions for Special Functions: For equipment overload warnings and overcurrent alarms, we can provide a reinforced version with alarm indicator lights. For low-power energy-saving retrofit projects, we can optimize circuit power consumption parameters to suit low-power applications in renewable energy and energy storage scenarios.

6. Installation and Commissioning Guidelines
Applicable Product: Qidian QD-10 Blue Housing, Three-Terminal Isolated, Hall-Effect AC/DC Current Transmitter
This document consists entirely of text listed item by item, with no tables or abbreviations, designed to align with the practical needs of field engineers and minimize installation errors, wiring faults, and commissioning issues.
6.1 Pre-Installation Preparation
--- Component Verification: After unpacking, inspect the unit's exterior to ensure the blue housing is free of cracks or deformation, and that terminals are secure and undamaged. Confirm the product label displays the complete model number QD-10, and verify that the input range and output signal specifications match the procurement parameters. Check that screws and terminal blocks are intact, with no missing parts or signs of oxidation or corrosion.
---Environmental Inspection: Ensure the installation location is in a dry environment, such as an indoor control cabinet or a sealed electrical enclosure; keep the unit away from high-temperature heat sources, highly corrosive gases, areas with dust accumulation, high-frequency inverters, and high-power electromagnetic equipment; ambient temperature and humidity must fall within the product's rated operating range; direct installation in environments with condensation, standing water, or exposure to rain is prohibited.
---Tool List: Prepare a Phillips-head insulated screwdriver, insulated wire strippers, a multimeter, insulated gloves, cable ties, and cable tray mounting hardware. For the commissioning phase, prepare a signal tester or a PLC analog input module for signal verification.
---Safety Precautions: Before installation, the on-site high-voltage and control power supplies must be disconnected, and power-off procedures must be strictly followed; separate high- and low-voltage wiring zones, and wear insulated protective gear; do not connect or disconnect terminals while the power is on to avoid electric shock and module circuit burnout; confirm that the cables being tested are de-energized before performing cable routing.

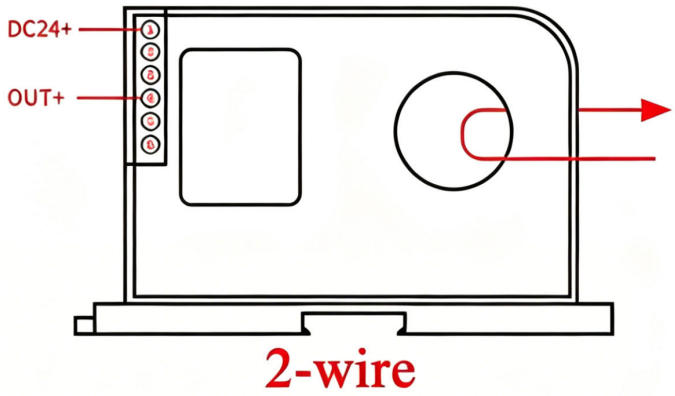
6.2 Standard Installation Steps
---Rail Mounting: Use an industrial-standard 35mm DIN mounting rail. Align the latches on the back of the QD-10 with the rail slots, press down firmly from top to bottom to secure, and confirm that the module's latches are fully engaged with the rail; gently shake left and right to ensure there is no looseness or slippage. When installing multiple units side-by-side, leave adequate spacing for heat dissipation to prevent overheating caused by tight stacking.
--- Wiring Specifications: Strictly distinguish between the three independent terminal groups: power supply terminals, current input terminals, and analog signal output terminals. These three groups are isolated and do not interconnect. Strictly distinguish between positive and negative terminals on the power supply to prevent reverse connection; the input side uses Hall-effect through-wire non-contact sensing, requiring no wiring—simply thread the cable through the sensor; the output terminals distinguish between signal positive and signal negative, corresponding to the analog ports of downstream PLCs and instruments.
--- Wiring and Routing Requirements: Power cables, high-voltage power lines, and low-voltage signal lines must be routed separately and placed in distinct cable trays; mixing them in the same conduit is prohibited. Select copper wires with appropriate gauge; strip the insulation to an appropriate length; tighten terminal screws firmly to ensure a secure connection; prevent loose connections, pinched wires, or exposed bare wires.
---Grounding Requirements: Ensure that the control cabinet's protective grounding is properly and reliably connected; ground the metal enclosures of all equipment to a common potential; ground signal shielded cables at a single point—specifically at the central control equipment side—while leaving the shielding layer at the transmitter end floating. This prevents ground loops caused by multiple grounding points and ensures stable three-terminal isolation.

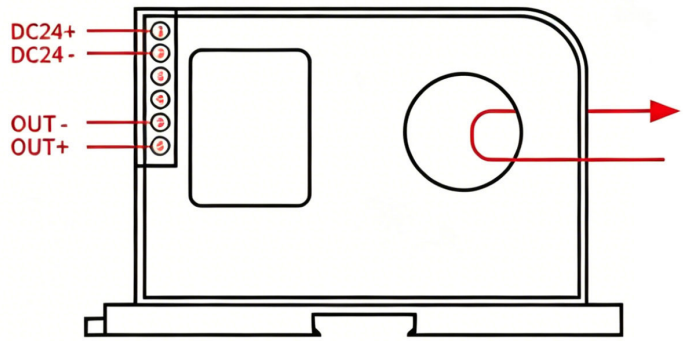
6.3, Wiring Diagram

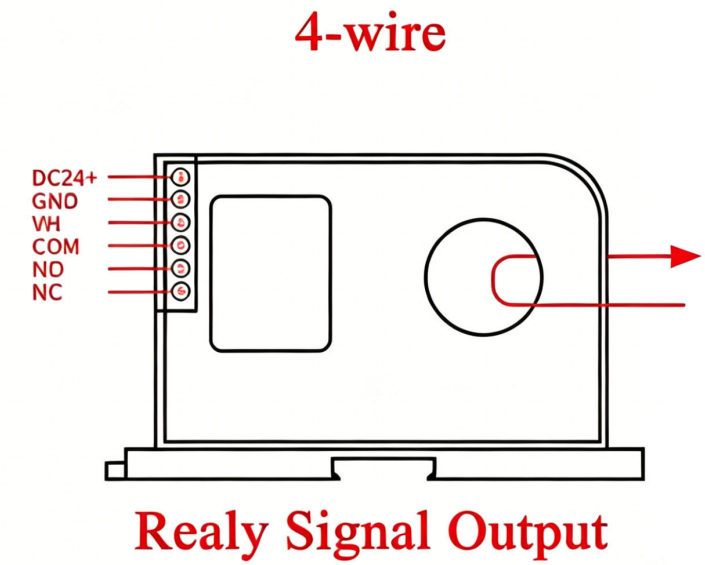


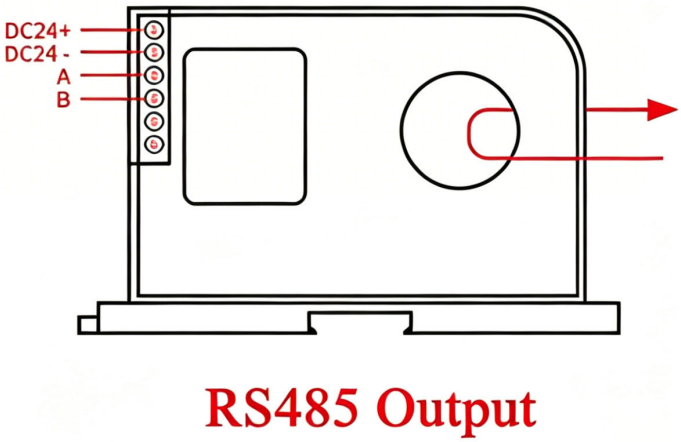


DC24V Power Supply

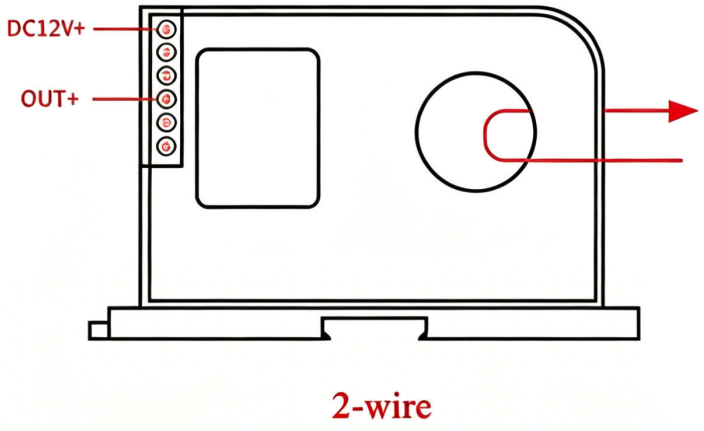


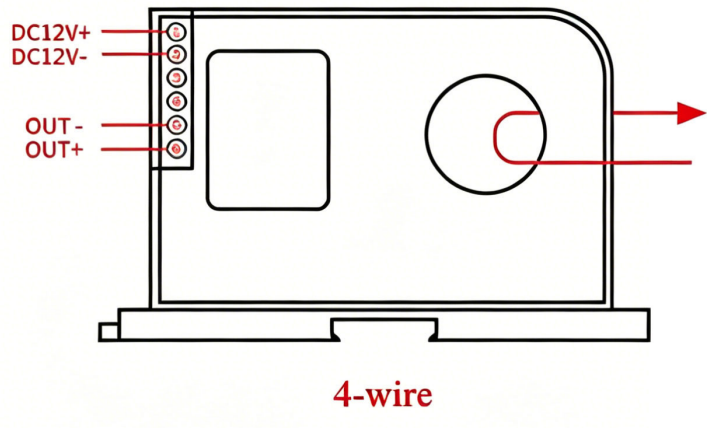


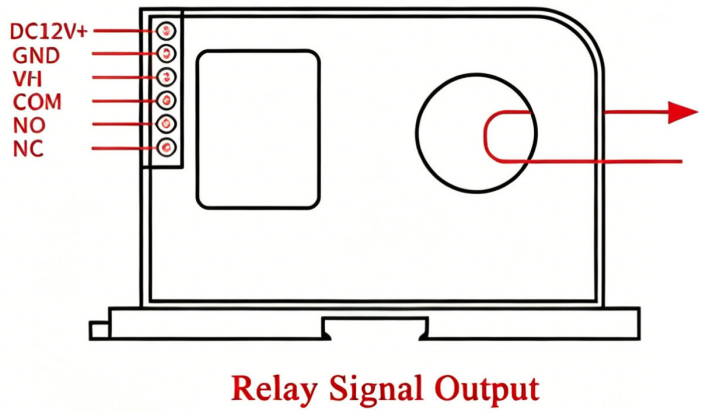


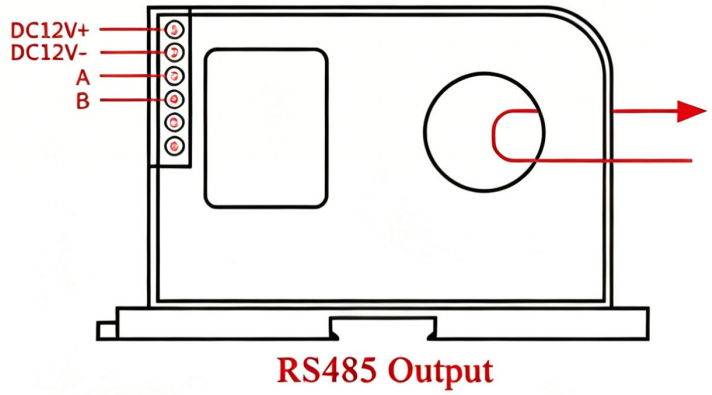


DC12V Power Supply









6.4 Power-On Debugging Procedure

---No-Load Test: After all wiring is complete and verified, apply the control power supply to provide a stable power source to the QD-10 module. Observe the status of the power indicator light on the unit; when power is supplied normally, the indicator light should remain steadily lit. If the light does not illuminate, troubleshoot for issues with the power supply voltage, positive and negative terminal connections, or circuit continuity.

---Static Signal Calibration: With the device under test in a no-load, no-current state, use a multimeter to measure the signal at the output terminals. The standard current output defaults to a static value of 4 mA, while the voltage output corresponds to the zero-point reference voltage. Verify that the zero-point output is normal and free of offset.

---Dynamic Load Test: Start the device under test on-site and operate it under normal rated load conditions. Read the transmitter's output signal values, calculate the actual current values based on the range ratio, and determine whether the collected data exhibits normal linearity.

---Indicator Status Assessment: A steady-on power indicator indicates normal power supply; for versions without a dedicated alarm indicator, signal abnormalities or sudden value fluctuations serve as the basis for fault determination; If values fluctuate erratically or the output exceeds limits, this is deemed to be caused by interference or wiring issues.

---Accuracy Calibration Method: The device has undergone precise calibration at the factory; no secondary on-site calibration is required under normal operating conditions. If slight temperature drift or zero-point offset occurs on-site, power can be cycled to restore factory settings. For high-precision industrial applications, linear correction can be performed in the background based on host system parameters without modifying the transmitter's hardware.

6.5 Installation Precautions and Protective Measures

---Strictly prohibit overvoltage: The power supply range is strictly limited to 18 V DC to 30 V DC. Do not connect AC voltage or high-voltage power sources, and do not operate at overvoltage for extended periods to prevent internal power circuits from breaking down or burning out.

---Avoid high-voltage interference: Keep the device away from high-electromagnetic equipment such as inverters, contactors, relays, and high-frequency welders; Maintain a safe distance between power cables and signal cables; avoid running them parallel over long distances to minimize electromagnetic coupling interference.

---Do not disassemble or modify the unit: The unit features an integrated, sealed design. Do not remove the blue housing, alter the internal circuitry, or short-circuit the isolation circuit. Unauthorized disassembly will result in the immediate loss of isolation performance and void the product warranty.
---Protection against humid environments: In high-humidity or moisture-heavy environments such as water treatment facilities or underground cabinets, install external sealed junction boxes and dehumidifiers. Apply anti-condensation treatment to terminal locations to prevent terminal oxidation, leakage, and short circuits.
--- Do not exceed the rated current range: Long-term measurement of loads exceeding the product's rated current range will cause internal Hall effect sensors to saturate and degrade, resulting in a permanent loss of measurement accuracy. Strictly match the load to the selected current range.

7: Recommendations for Daily Use and Maintenance

7.1 Key Points for Daily Inspections

1. Observation of Indicator Lights: During daily inspections, prioritize checking the status of the device's power indicator light. When power supply is normal, the power indicator light should remain steadily lit. If the light is off, flashing, or displays an abnormal color, immediately investigate the supply voltage, terminal contact conditions, and potential faults in the power circuit. For models without a dedicated alarm indicator light, use abnormal signal output values or data fluctuations as indicators of a fault.

2. Signal Stability Monitoring: Periodically check via the PLC, digital display, or host system to ensure the transmitter's output signal remains stable within the normal range, with no obvious fluctuations, drift, or disconnections. Compare signal variations under different operating conditions—such as no-load, rated load, and overload—to confirm normal linearity and the absence of signal saturation or distortion.

3. Operating Environment Temperature and Humidity Monitoring: During routine inspections, record the temperature and humidity inside the control cabinet to ensure the equipment operates within the rated range of -20°C to +60°C, with no condensation, frost, or excessive heat exposure. Maintain humidity between 10% RH and 90% RH (non-condensing range) to prevent terminal oxidation and deterioration of insulation performance caused by high humidity.

4. Visual Inspection and Installation Status Check: Inspect the blue housing for cracks, deformation, discoloration, or signs of corrosion; ensure the equipment is securely fastened to the 35 mm DIN rail with no loosening or slippage; verify that terminal blocks show no signs of overheating, oxidation, or loosening, and that cables are free from damage, aging, or deformation caused by compression.

7.2. Regular Maintenance Plan

1. Cleaning Frequency and Methods: In typical indoor control cabinet environments, cleaning and maintenance are recommended on a quarterly basis; in workshop environments with high dust levels, cleaning is recommended on a monthly basis. When cleaning, use a dry, soft-bristled brush or compressed air to remove dust and debris from the equipment surface and terminal blocks. Do not wipe the equipment directly with a damp cloth or liquid cleaning agents to prevent moisture ingress and short-circuit failures.

2. Wiring Tightness Inspection: Conduct a tightness inspection of all terminal blocks every six months, focusing on whether the screws on power terminals and signal output terminals are loose to prevent loose connections or poor contact caused by vibration or temperature changes. Simultaneously, inspect the cable entry points to ensure cables show no wear or displacement and that no foreign objects have accumulated in the cable entry holes.

3. Recommendations for Accuracy Recalibration: The equipment is factory-calibrated. Under normal operating conditions, an annual accuracy recalibration is recommended. For industrial high-precision measurement and critical control loop applications, recalibration is recommended every six months. Recalibration can be performed using a standard signal source or a high-precision multimeter to compare the transmitter's output signal with the actual current, confirming that the error remains within ±0.5% FS. If the deviation exceeds the standard, linear correction can be performed via the host computer's backend.

4. Isolation Performance Testing: Conduct an insulation withstand voltage test on the device every 2–3 years to verify that the isolation performance between the input, output, and power supply terminals is normal, with an insulation resistance of ≥1000 MΩ and an isolation withstand voltage of ≥2500 V AC. This prevents isolation failure caused by insulation aging due to long-term use.

7.3 Long-Term Maintenance Tips

1. Dust and Moisture Protection: Install dust-proof and dehumidification devices inside the control cabinet to prevent dust accumulation from affecting the equipment's heat dissipation and insulation performance. In high-humidity environments, place desiccants inside the control cabinet or install a heated dehumidification module to prevent condensation and moisture from entering the equipment. For outdoor or semi-outdoor installations, additional rain- and dust-proof junction boxes with an IP54 rating or higher must be installed.

2. Interference Mitigation Measures: Regularly inspect the grounding of shielded signal cables to ensure the shield is grounded at only one end (on the central control equipment side), while the shield on the transmitter side remains floating. This prevents ground loops caused by multiple grounding points. Maintain a safe distance between power cables and signal cables, and avoid running them parallel over long distances. If necessary, install metal shielding tubes around signal cables to enhance interference resistance.

3. Protection Against Extreme Environments: In high-temperature environments, ensure adequate ventilation and heat dissipation for control cabinets to prevent equipment from being exposed to temperatures above 60°C for extended periods. In low-temperature environments, implement insulation measures for control cabinets to prevent condensation caused by excessive temperature differences during equipment startup. In environments with highly corrosive gases, apply anti-corrosion coatings to the equipment's exterior or replace the housing with a corrosion-resistant model.

4. Load and Range Management: Do not operate the equipment beyond its rated range for extended periods to prevent saturation and aging of the internal Hall effect sensors. When shutting down the equipment for maintenance, disconnect the power supply before performing any operations; do not connect or disconnect terminal blocks while the equipment is energized. Equipment that will be idle for an extended period should be stored in a dry, well-ventilated environment free of corrosive gases to prevent damage caused by improper storage.

VIII. Troubleshooting & Emergency Procedures

8.1. List of Common Faults

No output signal from the device; no current/voltage output at the output terminals; no data displayed on the host computer or instrument
Signal values drift or fluctuate; measurement data is unstable; fluctuations exceed the normal error range
Power indicator light is off or flashing; for models without an alarm light, the device does not respond and produces no output signal
Alarm triggered (for models with alarm function), or output signal exceeds limits; value remains at full scale or zero for an extended period
Signal is distorted by interference; values exhibit a fixed offset or superimposed periodic noise, failing to reflect the actual current
Output signal attenuation; insufficient load-carrying capacity; readings on downstream instruments are significantly lower

8.2, Analysis of Fault Causes

--- Wiring-related faults: Reversed power supply polarity, reversed output signal terminals, both ends of the shielding wire grounded, incorrect cable routing (multiple wires in the same hole, folded routing)
--- Power Supply Abnormalities: Supply voltage exceeds the DC 18V–30V range; poor contact in the power supply circuit; excessive power supply ripple; reverse polarity protection triggered
--- Signal Overload Issues: Measured current consistently exceeds the transmitter's rated range; output load resistance exceeds the device's maximum capacity; short circuit in the signal output circuit
---Environmental interference faults: Power and signal cables routed in the same conduit; close-range interference from high-power

electromagnetic equipment; ground loop interference caused by ground potential differences; ambient temperature and humidity exceeding rated ranges

---Equipment damage faults: Power circuit burnout; Hall element saturation or aging; isolation circuit breakdown; damage to the output signal conditioning circuit

8.3 Step-by-Step Troubleshooting

1. Troubleshooting No Output Signal

Step 1: Check the power supply circuit. Use a multimeter to measure the voltage at the DC24V terminal to confirm that it is within the range of 18–30 V and that the positive and negative terminals are connected correctly. Check whether the power supply circuit's fuse or circuit breaker has tripped, and whether any terminals are loose or have a poor connection.

Step 2: Inspect the output circuit. Verify that the output terminals are wired correctly and that there are no short circuits or open circuits. Use a multimeter to measure the current/voltage at the output terminals to confirm the absence of an output signal.

Step 3: Inspect the device's wiring method. Ensure that a single cable passes through the ring-shaped sampling hole, and that there are no instances of multiple cables in the same hole or folded wiring. Confirm that the device is powered on and operating normally, with current flowing through it.

Step 4: After ruling out external faults, if there is still no output, determine that it is a hardware failure and proceed with the repair process.

2. Troubleshooting Signal Drift/Fluctuation

Step 1: Check wiring standards to ensure power and signal lines are routed in separate cable trays and are not run parallel over long distances; verify that shielded cables are grounded at a single point on the central control side only, with the shield left floating at the transmitter end, and that there are no multiple grounding points.

Step 2: Investigate power supply quality. Use a multimeter to measure power supply ripple and confirm there is no excessive interference; switch to an independent power supply to eliminate the impact of power supply interference.

Step 3: Check the installation location. Ensure it is located away from strong electromagnetic equipment such as variable frequency drives, contactors, and high-frequency welders; if necessary, use metal shielding tubing to wrap the signal lines.

Step 4: Check the ambient temperature and humidity. Confirm that the equipment is not in a condensing, high-temperature, or highly corrosive environment; Clean dust and oxidation from the terminals, and retighten the wiring.

Step 5: If drift persists, power off and restart the device to restore factory settings; if there is still no improvement, determine that internal components have aged and proceed with the repair process.

3. Troubleshooting Abnormal Indicator Lights

Step 1: If the power indicator light is off, first check the supply voltage and positive/negative wiring to confirm there is no reverse connection, undervoltage, or overvoltage; Check whether the terminals are loose or if there is an open circuit in the wiring.

Step 2: If the power indicator light is flashing, check the power supply for poor contact, excessive ripple, or voltage fluctuations; test with a replacement power supply to rule out power supply issues.

Step 3: If the indicator light is normal but there is no output, follow the troubleshooting procedure for "No Output Signal"; for models with an alarm light, if the alarm light remains on, follow the troubleshooting procedure for "Signal Out of Range / Overload."

4. Troubleshooting Signal Out-of-Range / Alarm Triggering Faults

Step 1: Check the actual current of the device under test to confirm whether it exceeds the transmitter's rated range or is operating under overload conditions; if it is a short-term overload, reduce the load current and observe whether the signal returns to normal.

Step 2: Check the output circuit load to confirm that the downstream load resistance is within the device's permissible range and does not exceed the maximum load; check whether the signal circuit is short-circuited, causing the output to exceed the range.

Step 3: Troubleshoot wiring errors to ensure output terminals are not reversed or loose; verify that the shielding wire is properly grounded to prevent false alarms caused by interference.

Step 4: If the alarm continues to trigger after ruling out external factors, determine that it is an internal device fault and initiate the repair process.

5. Interference Distortion / Value Offset Troubleshooting

Step 1: Check that the signal shielding cable is intact, with no damage or breaks in the shielding layer; reorganize the wiring to route signal cables separately from power cables, maintaining a safe distance.

Step 2: Check for ground loop interference. Disconnect the ground connection at the transmitter end and switch to single-ended grounding; verify that the control cabinet has proper equipotential grounding with no ground potential difference.

Step 3: Install a signal isolator in the signal loop to enhance interference resistance; adjust the equipment's installation location to move it away from strong sources of electromagnetic interference.

Step 4: If a fixed-value offset is present, perform linear correction via the host computer's backend; if correction is ineffective, determine that the device has experienced accuracy drift and initiate the repair process.

Emergency Workarounds

Single-loop failure: If a spare QD-10 transmitter is available on-site, quickly replace it after powering down to restore system operation; verify that the measurement range and output signal specifications match those of the original device before replacement.

Multi-loop Monitoring: If the failure occurs in a non-critical loop, temporarily adjust the system monitoring logic to prioritize the operation of critical control loops; replace the device during a scheduled shutdown window.

When No Spare Equipment Is Available: Temporarily power cycle the device. If the issue is caused by interference, normal operation may be temporarily restored after the restart, buying time to procure a replacement; however, do not operate the device in a faulty state for an extended period—replace it as soon as possible.

8.4, After-Sales Repair Guidelines

---Fault Determination Criteria

After conducting the step-by-step troubleshooting described above, if it is confirmed that the external power supply, wiring, load, and environment are all functioning properly, yet the device still has no output, abnormal signals, or isolation failure, the issue can be determined as a hardware failure, and a request for after-sales repair or replacement must be submitted.

If the device exhibits physical damage such as a cracked housing, burnt terminals, unusual internal noises, or strange odors, it should be immediately determined as a hardware failure without further troubleshooting, and continued use while powered on is strictly prohibited.

---Repair Process

Step 1: Contact the after-sales customer service of Anhui Qidian Automation Technology Co., Ltd. and provide the product model (QD-10), product serial number, purchase order number, fault symptoms, and on-site troubleshooting records.

Step 2: After the customer service confirms that the fault is covered by the warranty, they will provide the return address and repair process guidelines; for faults not covered by the warranty, they will provide a repair quote and estimated repair timeframe.

Step 3: Pack the equipment as instructed, complete the return form, and ship it to the designated address; upon completion of repairs, customer service will notify the customer, arrange for the return shipment of the equipment, and provide a test report.

---Warranty Coverage Statement

Standard Warranty Period: Within 12 months from the date of receipt of the purchase, equipment failures not caused by human damage or force majeure are eligible for free repair or replacement services.

Warranty Exclusions: Damage resulting from disassembly or modification by the user, overvoltage, exceeding the rated capacity, environmental corrosion, lightning strikes or power surges, or force majeure (such as fire, flood, or earthquake) is not covered under the free warranty.

Customized Equipment: The warranty scope for customized specifications and models is subject to the terms of the purchase contract; warranty terms for additional customized features shall be enforced in accordance with the contract.