I. Product Definition

The Qidian QD-21 blue-cased three-terminal isolated current transmitter is a high-precision device designed specifically for industrial automation applications to acquire, isolate, and convert current signals. Its core functions encompass three key areas: signal transmission, electrical isolation, and interference-resistant transmission. The complete functional specifications are as follows:

1. Current Signal Transmission and Conversion

Supports DC current input (e.g., the DC 0–20 A range shown in the model example; expandable to accommodate multiple AC and DC current specifications). It linearly converts high-current or highly interfered-with current signals collected on-site into industrial-standard 4–20 mA analog signals, compatible with the signal input requirements of downstream control systems such as PLCs, DCSs, and industrial instruments.

Conversion accuracy reaches 0.3% FS with excellent full-range linearity, accurately reproducing the waveform and value of the measured current. It supports both average and true RMS output modes, accommodating various current measurement scenarios such as DC, AC, and pulsed currents.

2. Three-Point Electrical Isolation Protection

Achieves complete electrical isolation across the input, output, and power supply sides, blocking the impact of high-voltage power, surges, and ground loop interference from the field on downstream control systems. The isolation strength meets industrial-grade standards, effectively protecting the port safety of precision equipment such as PLCs.

The isolation design eliminates signal drift and common-mode interference caused by ground potential differences, resolving signal transmission issues between systems with different potentials. It is suitable for highly interfered industrial environments such as chemical and power industries.

3. Industrial-Grade Signal Conditioning and Transmission

Built-in temperature compensation circuits and anti-interference filtering suppress the effects of on-site electromagnetic interference and voltage fluctuations on signals, ensuring signal stability under complex operating conditions.

Standard industrial power supply design (e.g., 24V DC) enables low-power operation and supports long-distance signal transmission, minimizing signal attenuation and distortion to meet the needs of distributed signal acquisition in industrial environments.

4. User-Friendly Industrial Design

Features a blue flame-retardant industrial housing with 35mm DIN rail mounting for quick installation in electrical cabinets. The modular terminal design clearly separates input, output, and power ports, simplifying wiring and reducing on-site installation and commissioning costs.

With a wide operating temperature range, it withstands harsh industrial environments—including extreme temperatures and high humidity—and supports long-term continuous operation, thereby reducing long-term maintenance costs.

II. Working Principle

You can think of this transmitter as an “industrial current translator and isolation guard”:

1. The Translator Role: AC and DC current signals from the field are like dialects of different languages. The back-end PLC or control system can only understand the “4–20 mA standard signal.” The core function of the transmitter is to accurately translate these “dialect” currents into the standard language that the control system can directly recognize, while ensuring translation accuracy and linearity.

2. Isolation Guardian Role: In industrial field environments, high-voltage interference, ground potential differences, and surge impacts act like “noise and danger signals.” The transmitter’s three-terminal isolation design effectively erects a protective barrier around the control system, preventing these interferences from damaging downstream equipment or affecting the accuracy of signal translation.

Complete Workflow

1. Signal Sampling Stage

The AC or DC current being measured is connected to the device via the transmitter’s input terminals. Through a high-precision sampling circuit (Hall effect or resistive sampling, adapted to different current ranges), the high-current signal is converted into a weak, processable voltage signal, completing the initial signal acquisition.

2. Isolation and Conditioning Stage

The weak signal, after sampling, enters a three-terminal isolation circuit. Using linear opto-isolation or magnetic isolation technology, this circuit achieves electrical isolation between the input, output, and power supply sides, thereby blocking the transmission of interference. At the same time, built-in temperature compensation and filtering circuits correct for temperature drift and filter out electromagnetic interference, ensuring signal purity and stability.

3. Linear Conversion Stage

The conditioned signal enters the amplification and linearization circuit, where it undergoes a linear proportional conversion according to the preset range (e.g., 0–20 A corresponds to 4–20 mA). This converts the voltage signal into a standard 4–20 mA current signal, ensuring a 1:1 linear relationship between the input current and the output signal without signal distortion.

4. Standard Output Stage

The converted 4–20 mA standard signal is transmitted via the output terminals to a PLC, DCS, or industrial instrument for data acquisition, monitoring, and control by the control system. Simultaneously, the device draws its operating power from the 24 V DC power supply terminal, enabling fully isolated three-terminal operation throughout the process.

III. Core Value and Solutions to Pain Points

Summary of Core Value

The core value of the Qidian QD-21 Transmitter is to provide an integrated current signal processing solution featuring “precise acquisition, secure isolation, and stable transmission” for industrial automation scenarios. It addresses three major pain points: the inability to directly connect field current signals to control systems, signal distortion in high-interference environments, and the susceptibility of device ports to damage. This helps customers achieve reliable monitoring and control of industrial currents, reduce system failure rates, and improve data acquisition accuracy.

Pain Points and Solutions

Q: Why can’t high-current or AC/DC current signals from industrial sites be directly connected to PLCs or control systems?

A: The analog input ports of control systems such as PLCs and DCS typically only support standard low-voltage signals like 4–20 mA or 0–10 V and cannot directly handle the high-current, high-voltage signals found in industrial environments; Additionally, the linearity and stability of non-standard signals fail to meet the acquisition requirements of control systems; direct connection can result in port burnout or data distortion. The QD-21 transmitter linearly converts non-standard AC/DC current signals into standard 4-20mA signals, meeting the input requirements of all mainstream industrial control systems, while its isolation design ensures port safety.

Q: What should be done if ground potential differences and electromagnetic interference in industrial environments cause current signal drift and fluctuations, resulting in inaccurate data acquisition by the control system?

A: Ground potential differences and electromagnetic interference are common issues in industrial signal acquisition, leading to common-mode interference and zero-point drift, which severely affect data accuracy. The QD-21 transmitter’s three-terminal isolation design breaks the electrical connection between the input and output sides, eliminating ground loop interference. Its built-in filtering and temperature compensation circuits suppress electromagnetic interference and correct temperature drift, ensuring signal stability and accuracy (0.3% FS) in highly interfered environments, thereby ensuring that collected data is accurate and reliable.

Q: Control system ports are frequently damaged by high-voltage surges and interference from the field, resulting in high maintenance costs. How can this be resolved?

A: The start-up and shutdown of industrial equipment in the field, lightning surges, and voltage fluctuations can all be transmitted through current signal lines to the control system, causing port burnout. The QD-21 transmitter’s three-terminal isolation design acts as an “electrical

firewall" between high-voltage field power and the control system. It withstands industrial-grade isolation voltage, blocks the transmission of surges and high-voltage interference, and effectively protects the ports of precision equipment such as PLCs and DCS systems, significantly reducing equipment failure rates and maintenance costs.

Q: Current ranges vary across different applications. How can we address the challenges of adapting the signal acquisition system when expanding or replacing equipment in the future?
A: Current measurement scenarios in industrial settings are diverse, with ranges varying from a few amperes to several hundred amperes. Traditional signal acquisition devices lack versatility and are costly to replace. The QD-21 transmitter supports multi-range customization (e.g., the base model covers 0–20 A DC and can be expanded to accommodate other AC and DC current ranges). It outputs a standardized 4–20 mA signal across all ranges. When replacing transmitters with different ranges in the future, the downstream control system requires no configuration changes and remains fully compatible, thereby reducing system expansion and maintenance costs.

Q: What can be done about limited installation space in industrial electrical cabinets, complex equipment installation and wiring, and troublesome commissioning?
A: The QD-21 transmitter features a 35mm standard DIN rail mounting design, compatible with common electrical cabinet rails for easy installation; its modular terminals clearly distinguish input, output, and power supply ports, with explicit wiring labels to reduce the likelihood of wiring errors; The blue housing design facilitates on-site identification, and the device supports plug-and-play functionality, eliminating the need for complex commissioning and significantly reducing the time required for on-site installation and commissioning.

Q: In harsh environments such as chemical and power plants, long-term operation of equipment is prone to failures that affect system stability. How can this be addressed?
A: The QD-21 transmitter features an industrial-grade flame-retardant housing and wide-temperature components, supporting long-term continuous operation in harsh environments such as wide temperature ranges, high humidity, and dusty conditions; its built-in low-power circuit design reduces equipment failure rates; it requires no periodic calibration and offers excellent long-term operational stability, making it suitable for scenarios with high reliability requirements—such as chemical, power, and new energy sectors—to ensure stable system operation.

IV. Key Product Specifications

4.1. Basic Electrical Specifications

The following specifications are based on the QD-D21 model (DC 0–20 A version) and general industrial standards for the series, and can be customized to accommodate the full range of AC and DC current ranges:

Input Specifications

Input Signal Type: DC current (supports an AC current version for both power-frequency and non-power-frequency applications)

Typical Input Range: DC 0–20 A (Customizable ranges include DC 0–1 A, 0–5 A, 0–50 A, and 0–100 A; AC versions are available in 0–5 A, 0–10 A, and 0–500 A)

Input Overload Capacity: 1.2 times rated current continuously, 10 times rated current instantaneously (within 1 second), without permanent damage

Input Frequency Range: DC / 0–10 kHz (AC versions: 45–65 Hz power frequency; special versions support high-frequency signals)

Input Impedance: ≤0.1 Ω (current input mode, ensuring minimal impact on the voltage drop of the circuit under test)

Output Specifications

Output Signal Type: DC 4–20 mA (industrial standard current loop signal; customizable 0–20 mA, 0–5 V, or 0–10 V voltage outputs available)

Output Load Capacity: ≤600 Ω for current output (suitable for long-distance transmission; meets PLC/DCS input port requirements)

Output Ripple: ≤10 mVpp, with no additional interference introduced

Linearity Error: ≤±0.1% FS, fully linear response with no distortion

Response Time: ≤200 ms (typical value; fast-response versions ≤50 ms available upon request)

Reverse Polarity Protection: Supports reverse connection protection at the output terminal; no risk of equipment damage due to reverse connection

Accuracy and Stability Parameters

Measurement accuracy class: Class 0.3 (±0.3% FS; high-precision versions with Class 0.2 or 0.1 accuracy are available within the same series)

Temperature drift: ≤±50 ppm/°C (across the entire temperature range, ensuring measurement stability in both high- and low-temperature environments)

Zero Drift: ≤±0.1% FS/year; no zero offset during long-term operation

Repeatability Error: ≤±0.1% FS; excellent consistency across multiple measurements

4.2 Isolation Performance Parameters

Isolation Structure: Fully electrically isolated on the input, output, and power supply sides; independent insulation circuits with no common ground connection

Isolation Withstand Voltage

Input-Output Isolation: ≥2000 V AC (1 minute, leakage current ≤1 mA); optional high-isolation version with 3000 V

Input-Power Supply Isolation: ≥2000 V AC (1 minute, leakage current ≤1 mA)

Output-Power Supply Isolation: ≥1500 V AC (1 minute, leakage current ≤1 mA)

Isolation Characteristics

Common-Mode Rejection Ratio (CMRR): ≥100dB, effectively suppressing on-site common-mode interference and ground potential differences

Isolation Method: Linear optocoupler isolation / magnetic isolation technology, ensuring distortion-free signal transmission and suitability for high-precision measurement scenarios

Insulation Resistance: ≥100MΩ (tested at DC 500V), with stable insulation performance during long-term operation

4.3 Power Supply & Power Consumption Parameters

Power Supply Specifications

Typical Supply Voltage: DC 24V (compatible with 18–30V wide-range input, suitable for power fluctuations in industrial environments)

Power Supply Method: Three-wire power supply (Power +, Power –, Ground; some versions support two-wire loop power supply)

Polarity Protection: Supports reverse polarity protection; no risk of equipment damage due to reverse connection

Power Consumption Parameters

Standby Power Consumption: ≤1W (under no-load conditions, low-power operation)

Full-Load Power Consumption: ≤2W (at 20mA full-load output, meeting industrial field low-power requirements)

Power Distribution Output: No additional power distribution output (pure signal conversion and isolation device, no auxiliary power distribution function)

Power Supply Stability

Voltage Fluctuation Tolerance: The device operates normally without performance degradation within a ±20% fluctuation range of the rated voltage

Ripple Suppression: Power supply ripple suppression ratio ≥60dB, filtering out the impact of power supply interference on the signal

4.4 Environmental Adaptation Parameters

Operating Environment Temperature and Humidity

Operating Temperature Range: -10°C to +70°C (industrial-grade wide temperature range, suitable for standard industrial environments; optional -40°C to +85°C high/low-temperature custom versions available)

Relative Humidity: 10%–90% RH (non-condensing; avoid damp environments to prevent deterioration of insulation performance)

Storage Environment Temperature and Humidity

Storage Temperature Range: -25°C to +85°C

Storage Humidity: 5%–95% RH (non-condensing)

Protection and Explosion-Proof Ratings

Enclosure Protection Rating: IP30 (protects against ingress of solid foreign objects larger than 2.5 mm in diameter; suitable for indoor electrical cabinet installations)

Explosion-proof Rating: Standard models are not explosion-proof certified and are suitable for non-hazardous areas; intrinsically safe versions are available upon request and can be paired with safety barriers for hazardous chemical environments

Vibration Resistance: Complies with IEC 60068-2-6 standard; within the 10–150 Hz vibration range, the device exhibits no mechanical damage or

performance degradation
4.5. Physical Specifications
Mounting Method: Standard 35mm DIN rail mounting, compatible with standard electrical cabinet rails, supports quick snap-in installation and removal
Dimensions (L × W × H):
Standard Dimensions: Approx. 110mm × 25mm × 64mm (industry-standard rail module dimensions, suitable for high-density installation scenarios)
Terminal Pitch: Standard 5.08mm pitch terminal blocks, compatible with conventional industrial wiring specifications
Weight: Approx. 120g (per unit; lightweight design imposes no additional load on the DIN rail)
Indicator Light Definitions:
PWR Power Indicator: Located on the top left of the blue housing; remains lit when powered on; illuminates when the device is receiving normal power supply and turns off during power failure or undervoltage
No separate ALM alarm indicator (supported by some models in the same series; this basic version includes only the power indicator)
Housing Material and Protection Details:
Housing Material: Flame-retardant ABS+PC engineering plastic, industrial-grade blue color, excellent anti-aging and impact resistance
Housing Protection: Fully enclosed modular structure; terminals feature insulated covers to prevent accidental contact and short circuits; housing surface is insulated, with insulation strength meeting industrial safety standards
Heat Dissipation Design: Ventilation grilles on the sides facilitate natural convection cooling, suitable for continuous operation with no risk of overheating

V. Application-Specific Selection Guide
5.1 Key Selection Criteria
1. Signal Type Selection
Prioritize selecting the appropriate model based on the signal being measured on-site. For AC current signals, use the QD-21 AC series; for DC current signals, use the QD-21 DC series; for AC/DC universal signals, directly select the QD-21 fully compatible model. Ensure that the signal input matches the transmitter's measurement type to avoid measurement inaccuracies or data acquisition failures.
2. Channel Selection
For single-loop independent current monitoring scenarios, select the standard 1-in/1-out QD-21 model to meet basic signal acquisition and transmission requirements. For scenarios requiring a single input to be used simultaneously by both a PLC and an instrument, select the 1-in/2-out isolated distribution model to achieve synchronous signal transmission without mutual interference. For multi-loop centralized monitoring scenarios, choose a multi-channel integrated solution to reduce installation space and wiring costs.
3. Power Supply Selection
For conventional industrial electrical cabinets and automation equipment, select the standard 24 VDC QD-21 model, which is compatible with common on-site switching power supplies. In scenarios with limited wiring space or no dedicated power lines, choose the two-wire loop-powered version to simplify wiring. In environments with significant voltage fluctuations, prioritize the wide-voltage model to ensure stable equipment operation.
4. Selection Based on Explosion-Proof Requirements
In non-hazardous areas such as general workshops, electrical distribution rooms, and smart manufacturing production lines, directly select the standard QD-21 AC/DC current transmitter. In hazardous locations such as chemical, oil and gas, and pharmaceutical facilities where flammable and explosive gases or dust are present, the intrinsically safe (IS) customized QD-21 model must be selected and used in conjunction with a corresponding safety barrier; the use of standard models is strictly prohibited.
5. Selection Based on Installation Environment
For installation in standard electrical cabinets, choose the standard-sized QD-21 with a blue housing, designed for 35mm DIN rail mounting; for confined spaces or densely packed layouts, select the ultra-thin model; for harsh operating conditions involving high temperatures, high humidity, or high dust levels, select the wide-temperature, reinforced QD-21 to enhance environmental adaptability.

5.2. Recommended Models for Industry Applications
1. Chemical Industry Applications
For current monitoring in chemical production environments involving corrosive conditions, flammable and explosive zones, and strong electromagnetic interference, we highly recommend the QD-21 AC/DC current transmitter—available in a three-terminal isolated reinforced version or a custom intrinsically safe explosion-proof model. This device is suitable for monitoring the current of equipment such as reactors, transfer pumps, and compressors, meeting requirements for explosion protection, anti-interference, and safe isolation.
2. Power Industry Applications
For AC/DC current acquisition in power distribution, substations, photovoltaic and wind power facilities, and high/low-voltage switchgear, we recommend the high-isolation, high-voltage-rated, high-precision QD-21. It accurately monitors circuit currents and equipment operating currents, effectively blocking ground potential differences and surge interference to ensure the safety of relay protection devices and PLC control systems.
3. Metallurgy Industry Applications
The metallurgy industry features complex operating environments characterized by high currents, intense vibrations, and high-temperature dust. We recommend the wide-temperature, high-overload-capacity QD-21 model, which is suitable for current monitoring of high-power equipment such as smelting equipment, rolling mills, fans, and water pumps, ensuring stable and undistorted signals.
4. Pharmaceutical Industry Applications
For current monitoring of automated production lines and sterile equipment in cleanrooms and explosion-proof zones within pharmaceutical facilities, we recommend the explosion-proof or standard cleanroom-rated QD-21. Its blue industrial housing is easy to clean and resists dust accumulation, meeting the safety standards and automated monitoring requirements of the pharmaceutical industry.
5. Smart Manufacturing Applications
For current monitoring of smart equipment such as automated production lines, CNC machine tools, robots, and packaging equipment, we recommend the standard 1-input/1-output QD-21 model. Powered by 24V DC and designed for DIN rail mounting, it features simple wiring and fast response times, making it suitable for real-time data acquisition by PLCs and equipment operation protection.
3. Water Treatment / Environmental Protection Industry Applications
For current monitoring of pumps, fans, chemical dosing systems, and wastewater treatment equipment, we recommend the general-purpose standard QD-21. Its three-terminal isolation design effectively suppresses on-site interference, ensuring accurate acquisition of current signals related to liquid level and flow.

5.3 Common Selection Pitfalls
Pitfall 1: Ignoring Isolation Level
Focusing solely on accuracy and measurement range while neglecting three-terminal isolation performance, and selecting low-isolation models in environments with strong interference or high ground potential differences, can easily lead to signal drift and damage to control system ports. When selecting a model, you must prioritize confirming the QD-21 three-terminal fully isolated specification.
Pitfall 2: Incorrect Signal Range Selection
Selecting a range significantly larger than the actual measured current causes a significant drop in measurement accuracy; conversely, selecting a range smaller than the actual current causes the transmitter to overload and fail. The QD-21 range should be determined based on 1.2 to 1.5 times the maximum actual current at the site.
Misconception 3: Neglecting Load Matching
Failure to calculate transmission distance and the impedance of downstream equipment, resulting in the selection of a model with insufficient output load capacity, leads to signal attenuation and abnormal data acquisition during long-distance transmission. When using the QD-21, ensure that the total resistance of the output circuit does not exceed the rated load value.
Misconception 4: Selecting General-Purpose Models for Explosion-Proof Environments
In hazardous explosive environments such as chemical and oil and gas facilities, directly using standard non-explosion-proof QD-21 models poses safety risks and violates regulations. In such scenarios, explosion-proof custom models must be selected and used in conjunction with safety barriers.

5.4 Customization Recommendations

1. Customization for Special Signals

For applications involving non-standard AC/DC current ranges, special frequency signals, or non-standard output signals (such as 0–5 V or 0–10 V), the QD-21 can be customized for input and output signals to achieve precise transmission of non-standard signals.

2. Customization for Non-Standard Operating Conditions

For special environments such as extreme high or low temperatures, highly corrosive conditions, or high protection ratings, the QD-21 can be customized with wide-temperature, high-protection, or anti-corrosion coating variants to enhance the device's service life and stability under harsh conditions.

3. Multi-Channel Integrated Customization

For scenarios requiring simultaneous monitoring of multiple current signals, a multi-channel integrated QD-21 transmitter can be customized to enable isolated signal acquisition across multiple circuits, saving installation space, reducing wiring, and lowering overall system costs.

4. Functional Expansion Customization

Features such as alarm outputs, RS485 communication, and dual independent isolated outputs can be added as needed, allowing the QD-21 to adapt to more complex automated monitoring and control systems.

VI: Installation and Commissioning Guidelines

6.1 Pre-installation Preparation

Verification of Components

Unpack the unit and verify that the QD-21 blue-cased AC/DC current transmitter is in good condition. Confirm that the model, range, and isolation method match the order specifications, and ensure there are no damages, cracks, or deformed terminals. Check that all accompanying terminal screws and rail clips are present and complete.

Environmental Inspection

Confirm that the installation location is inside an indoor electrical cabinet, free from heavy dust, corrosive gases, excessive condensation, and strong electromagnetic sources. Ensure that the ambient temperature and humidity fall within the product's operating range, and keep the unit away from high-power inverters, contactors, transformers, and other strong interference-generating equipment.

Tool List

Prepare a Phillips screwdriver, wire strippers, a multimeter, wire terminals, electrical tape, and rail mounting tools; a standard signal source or current simulator is required during the commissioning phase.

Safety Precautions

The on-site power supply must be disconnected before installation; live wiring is strictly prohibited. Ensure that wiring personnel possess the necessary electrical certification. Before wiring, distinguish between high-voltage circuits and low-voltage signal circuits to prevent accidental connection to high voltage, which could destroy the equipment.

6.2 Standard Installation Procedure

Mounting on the Rail

Align the latches on the back of the QD-21 transmitter with a standard 35mm DIN rail, then press down evenly to secure it, ensuring the device is neither loose nor crooked. When installing multiple units side by side, maintain an appropriate spacing to ensure adequate space for heat dissipation and wiring.

Wiring Specifications

Strictly distinguish between the power supply, input, and output terminals according to the terminal markings. Route the three sets of wires separately and avoid bundling them together.

Power Supply Terminals: Connect to a 24 VDC power source, distinguishing between positive and negative terminals. Reversing the polarity is strictly prohibited.

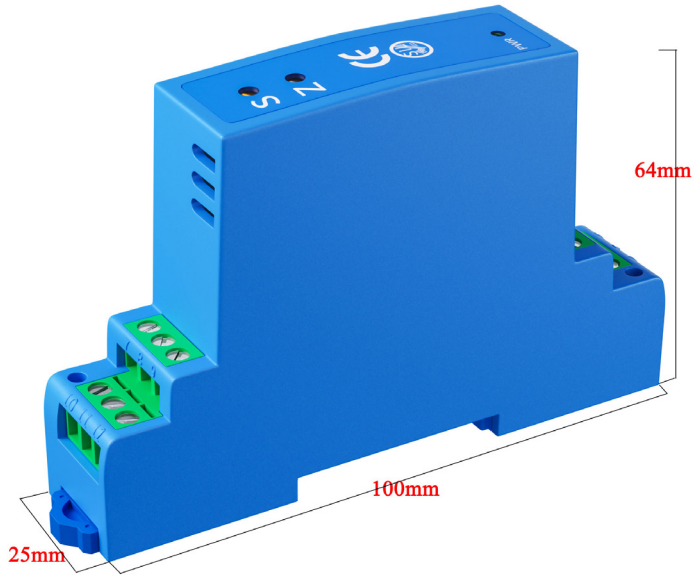
Input Terminals: Connect to the AC or DC current loop being measured, inserting the transmitter into the measurement circuit. Pay attention to the direction of the current.

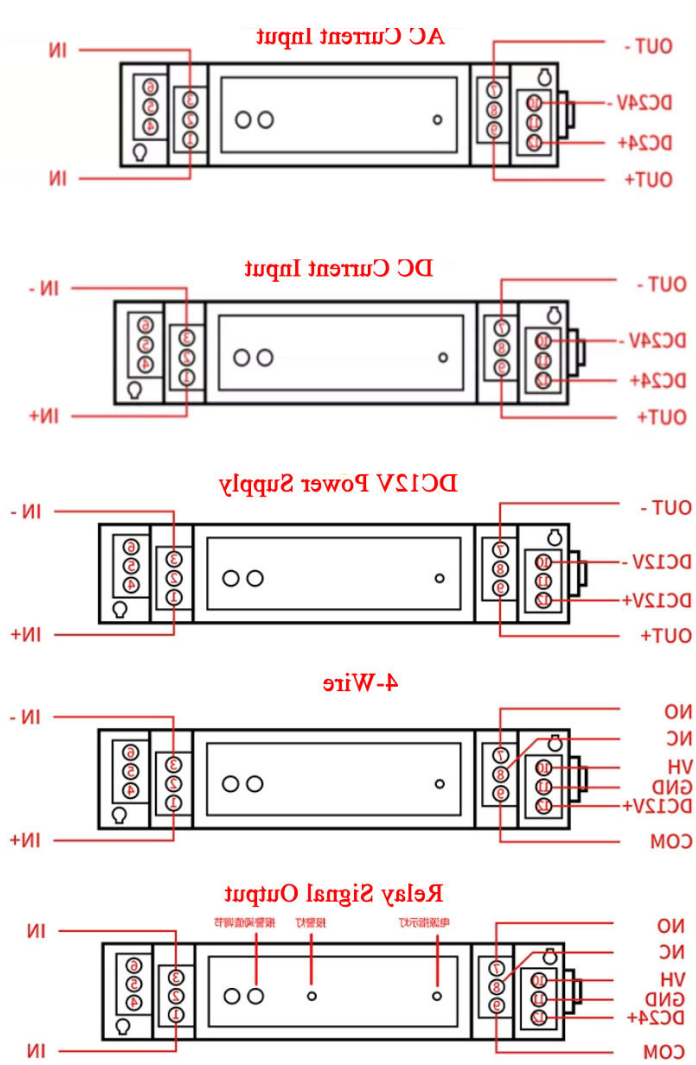
Output Terminals: Connect to data acquisition devices such as PLCs, DCS systems, or instruments to form a standard 4–20 mA loop.

Grounding Requirements

The transmitter housing and shielding layer must be grounded at a single point, with grounding resistance meeting industrial standards; use shielded cables for input and output connections, grounding the shielding layer at a single end—do not ground both ends simultaneously to prevent ground loop interference; strictly prohibit mixing signal ground with power ground.

6.3, Wiring Diagram





6.4 Power-On Debugging Procedure

No-Load Test

Connect the DC 24V power supply. Observe that the PWR power indicator remains lit to confirm normal power supply; ensure there are no alarms, no overheating, and no unusual odors, and that the unit operates stably under no-load conditions.

Signal Verification

Apply a standard analog current signal to the input and use a multimeter to measure the 4–20 mA output signal to verify the input-output correspondence; zero point corresponds to 4 mA, full scale corresponds to 20 mA, and the error is within the allowable range.

Indicator Status Assessment

A steady PWR light indicates normal power supply; if the light is off, check the power supply wiring and voltage to ensure they are normal.

This model does not have an ALM alarm light; abnormalities are determined based on signal deviation and equipment overheating.
Accuracy Calibration Method
If zero-point or full-scale deviation occurs, use the internal calibration potentiometer for fine-tuning; adjust the zero-point so that the output is 4 mA when the input is zero, and adjust the full-scale so that the output is 20 mA when the input is full scale; after calibration, tighten the screws to prevent drift due to vibration.

6.5 Installation Precautions
Never exceed the specified power supply range. Do not connect to high-voltage power sources such as AC 220V to prevent instantaneous module breakdown.
Avoid running input and output cables parallel to power cables or inverter cables over long distances to prevent signal fluctuations caused by electromagnetic interference.
Direct installation in environments with condensation, standing water, or severe corrosion is strictly prohibited; a protective enclosure must be installed, or the reinforced protection version must be selected.
Do not connect excessive currents exceeding the measurement range to prevent the internal sampling circuit from burning out.
Do not insert or remove terminals while the device is powered on, and do not forcefully pry open the housing to avoid damaging the internal isolation circuit.
In explosion-proof zones, it is strictly prohibited to disassemble the housing or modify the wiring without authorization; installation must strictly comply with explosion-proof regulations.

VII: Recommendations for Daily Use & Maintenance
7.1 Key Points for Routine Inspections
1. Observing Indicator Light Status
During inspections, pay close attention to the PWR power indicator light on the QD-21 transmitter; it should remain lit under normal conditions. If the light is off or flashing, immediately check whether the supply voltage is normal, whether any connections are loose, or whether there is an open circuit in the power supply circuit, and promptly resolve any power supply issues.
2. Monitoring Signal Stability
Use a backend PLC, industrial control instrument, or on-site multimeter to monitor in real time whether the transmitter's 4–20 mA output signal is stable, free of fluctuations, drift, or unexplained zeroing. Compare the actual operating current of the equipment with the transmitter's output value to determine if signal transmission is normal, thereby preventing data distortion caused by interference or module aging.
3. Temperature and Humidity Monitoring
Check the ambient temperature and humidity at the transmitter's installation location to ensure it operates within the range of -10°C to +70°C and 10% to 90% RH (non-condensing). Pay close attention to whether condensation, localized overheating, or excessive dust accumulation has occurred inside the cabinet to prevent impacts on insulation and measurement accuracy.

7.2 Periodic Maintenance Plan
1. Recommended Cleaning Intervals
Clean the blue housing and terminal area of the QD-21 every 6 months using a dry brush or compressed air to remove surface dust. Do not wipe directly with liquids such as water or alcohol. In dusty environments such as metallurgy or building materials facilities, cleaning intervals may be shortened to every 3 months to maintain proper heat dissipation and insulation.
2. Wiring Tightness Inspection
Every 12 months, thoroughly tighten the screws on the power, input, and output terminals, and inspect for issues such as looseness, oxidation, loose connections, or discoloration due to overheating. In high-vibration environments (e.g., near fans or pumps), it is recommended to inspect every 6 months to prevent poor contact or signal interruption caused by vibration.
3. Recommendations for Accuracy Recalibration
Under standard operating conditions, calibrate the transmitter every 24 months using a standard current source to verify that the output value falls within the ±0.3% FS error range. In high-precision applications such as chemical processing and power generation, recalibration is recommended annually; if deviations occur, calibrate or replace the unit promptly.

7.3 Long-Term Maintenance Tips
1. Dust and Moisture Prevention Measures
When electrical cabinets are left closed for extended periods, install dust filters and desiccants to reduce the ingress of dust and moisture. In outdoor or humid environments, install moisture-proof heating modules to prevent condensation from causing short circuits or degrading insulation performance. Ensure the blue enclosure remains intact and undamaged to prevent internal components from becoming damp or oxidized.
2. Anti-Interference Optimization and Maintenance
During long-term use, ensure that signal shielding cables are grounded at one end and avoid bundling high- and low-voltage lines together. Periodically check whether high-interference equipment inside the cabinet, such as inverters and contactors, is equipped with shielding and filtering to reduce electromagnetic interference with the QD-21 transmitter and ensure long-term signal stability.
3. Protection in Extreme Environments
In high-temperature environments, ensure adequate ventilation and heat dissipation within the cabinet, and avoid placing the transmitter near heaters or high-power devices; In low-temperature environments, implement additional insulation measures to prevent component performance drift; in corrosive environments, install anti-corrosion sleeves on the transmitter housing to delay aging and extend service life.
4. Operational Status Logging
Establish a simple operation and maintenance log to record power-on duration, accuracy calibration results, and fault resolution records. This facilitates problem tracing, anticipates aging, enables preventive maintenance, and reduces the likelihood of sudden failures.

VIII: Troubleshooting & Emergency Procedures
8.1 List of Common Faults
No current output after powering on the device; output remains at 0 mA or a fixed value
Current signal drifts, fluctuates, or varies erratically; values are unstable
Abnormal PWR power indicator: not lit, dim, or flashing
Output signal is severely distorted, out of range, or locked at full scale (20 mA)
Data fluctuations, display anomalies, or control malfunctions caused by on-site interference

8.2. Analysis of Fault Causes
1. No Output
Reversed power supply wiring, no power supply, or insufficient supply voltage
Input signal not properly connected to the circuit, or open circuit at the input terminal
Excessive output load, short circuit, or downstream equipment not properly connected
Internal circuit damage due to overload or high voltage
2. Signal Drift / Instability
Loose wiring, oxidation, or poor contact
Shielding wire not grounded or grounded at both ends, creating a ground loop
Temperature or humidity out of range; condensation inside the enclosure causing reduced insulation
Strong electromagnetic interference from nearby inverters or high-current cables
3. Abnormal Indicator Lights
Supply voltage is not within the DC 18–30 V range
Reverse polarity of power supply, loose power connections, or switching power supply failure
Internal short circuit triggering protection
4. Signal Distortion / Full-Scale Lockup
Actual measured current exceeds the transmitter's rated range
Accidental connection of high-voltage or voltage signals to the input terminals, causing damage to the sampling circuit
Excessive zero-point or full-scale drift due to lack of timely calibration
5. Abnormalities caused by interference
Signal lines and power lines are routed in the same conduit or laid in parallel
Unshielded cables are used, or the shield is grounded incorrectly
Three-terminal isolation failure, allowing ground potential difference interference to enter

8.3 Step-by-Step Troubleshooting

1. Fault: No Output

First, use a multimeter to measure the power supply terminals to confirm that the 24 VDC is normal.

Check whether the positive and negative power supply terminals are reversed, and reconnect the wires to the correct terminals.

Check whether the input current circuit is connected; look for broken wires or missing connections.

Measure whether the output terminals are shorted and whether the load resistance is too high (>600 Ω).

If there is still no output after ruling out the above issues, determine that the transmitter has an internal fault and immediately replace it with a spare unit.

2. Fault: Signal Drift or Fluctuation

Retighten all terminal screws to eliminate loose or intermittent connections.

Replace the shielded cable; ground the shield at one end only; do not ground both ends.

Route signal and power lines separately, keeping them away from inverters and transformers.

Check for condensation inside the cabinet; improve dehumidification and ventilation

Perform zero-point and full-scale calibration again

3. Fault: Indicator light does not illuminate / flickers

Measure the supply voltage; values below 18V or above 30V are abnormal

Check for broken power cables and ensure terminal crimping is secure

If the light remains off after ruling out power issues, it is likely due to internal protection or damage; initiate emergency replacement

4. Fault: Signal distortion, full-scale reading remains unchanged

Verify whether the actual on-site current exceeds the QD-21's rated range

Check whether voltage or high-voltage power has been mistakenly connected to the current input terminals

Calibrate using a standard signal source; if the deviation exceeds tolerance, recalibrate

If the issue cannot be resolved, replace the transmitter to avoid affecting system monitoring

5. Fault: Severe interference, data fluctuations

Route signal lines through separate conduits, away from 380V/220V power cables

Ensure complete isolation between input, output, and power supply terminals; do not share ground or short-circuit

Install filter chokes inside the cabinet and optimize the grounding system

If necessary, replace with a model featuring higher isolation ratings or add an isolation distributor

Emergency replacement solution

During troubleshooting, any malfunctioning unit can be temporarily replaced with an identical Qidian QD-21 transmitter. As long as the wiring matches, service can be quickly restored without affecting system downtime; the original unit can be repaired later.

8.4. After-Sales Repair Guidelines

1. Criteria for Determining a Malfunction

A product is deemed to have a malfunction and is eligible for repair if any of the following conditions are met:

Wiring, power supply, and load are all correct, but there is no output / the output remains fixed

The indicator light does not illuminate and there is no signal upon powering on a brand-new device

Accuracy deviates beyond tolerance or the device cannot be calibrated during normal use due to non-human factors

Internal damage occurs without overloading, incorrect wiring, or high-voltage intrusion

2. Repair Process

Take photos: Device appearance, terminal wiring, power supply measurements, and fault symptoms

Verify model: Confirm the QD-21 model, range, production date, and purchase information

Contact After-Sales Support: Provide a description of the fault and photos to request inspection or replacement

Return to Factory / Replacement: Ship the unit for repair according to after-sales instructions or request a direct replacement

3. Warranty Coverage

Within Warranty Period: Free repair or replacement for quality issues arising from normal use

Exclusions: Damage caused by incorrect high-voltage connections, exceeding the measurement range, mechanical damage, unauthorized disassembly or repair, moisture-related burnout, or use in non-standard operating conditions not previously disclosed