QD-14 Hall Current Transducer

I. Product Definition

The Qidian QD-14 series is a three-terminal isolated AC/DC current transmitter based on the Hall effect principle. It features a blue standard industrial housing (compatible with 35mm DIN rail mounting) and is specifically designed for the acquisition, isolation, conversion, and transmission of current signals in industrial environments. Its core functions include the following:

1. Precise Current Signal Acquisition: Supports DC/AC current inputs and accommodates various standard ranges such as 0–20 A, 0–50 A, and 0–100 A. Customized extended ranges can be provided based on field requirements, enabling non-contact sampling of current signals from industrial circuits.
2. Standardized Signal Conversion: Linearly converts acquired current signals into industry-standard analog signals, such as 4-20mA, 0-5V, and 0-10V, ensuring compatibility with mainstream industrial control equipment including PLCs, DCS systems, and industrial control instruments.
3. Three-Circuit Electrical Isolation Protection: Achieves complete electrical isolation between the input circuit, output circuit, and power supply circuit, with an isolation rating of up to 2500 V AC. This effectively blocks ground loop interference, common-mode interference, and surge impacts in industrial environments, protecting downstream control equipment from damage.
4. Stable Operation in Wide Operating Conditions: Supports standard 24V DC industrial power supply and operates stably in a wide temperature range of -25°C to +70°C. With an accuracy class of up to 0.2 and a linearity error of ≤0.1%, it ensures measurement stability under complex operating conditions.
5. Industrial-Grade Protection and Installation: Features a blue flame-retardant ABS housing with dust- and oil-resistant properties. Compatible with standard 35mm DIN rail mounting, it requires no complex wiring and can be directly installed inside industrial control cabinets, making it suitable for the vast majority of automation field applications.

II. Working Principle

At the heart of this transmitter is the Hall-effect magnetic balance closed-loop measurement principle. Combined with a three-terminal isolation circuit, it implements a complete “sampling – isolation – conversion – output” process, which can be broken down as follows:

Step 1: Non-contact Current Sampling

The current being measured (DC/AC) passes through the cable entry hole in the center of the transmitter, generating a corresponding magnetic field around it. The Hall element inside the transmitter detects changes in the intensity of this magnetic field and converts them into a weak voltage signal.

Step 2: Magnetic Balance Closed-Loop Compensation

The compensation coil inside the transmitter generates a counter-magnetic field that is equal in magnitude but opposite in direction to the magnetic field of the measured current. This offsets the influence of the measured magnetic field, ensuring the Hall element always operates in a zero-flux state. This closed-loop design significantly improves measurement accuracy and prevents temperature drift and nonlinear errors.

Step 3: Three-Port Electrical Isolation

The faint signal obtained from sampling is processed through an isolation circuit, completely severing the electrical connection between the input circuit, output circuit, and power supply circuit. This prevents high-voltage and interference signals from the front end from entering the back end, and also prevents control signals from the back end from affecting the measurement accuracy at the front end.

Step 4: Signal Linearization and Output

The isolated signal is processed through amplification, filtering, and linearization circuits, ultimately converted into a standard analog signal (such as 4–20 mA) as specified by the user. This signal is then output to a PLC or industrial control device, enabling long-distance, interference-resistant transmission of the current signal.

III. Core Value and Pain Point Solutions

1. Customer Pain Points: Ground loop interference and high common-mode noise in industrial environments cause signal fluctuations and inaccurate data in PLCs, and can even damage control equipment.

Q: Why do signal fluctuations and data inaccuracies occur in industrial environments?

A: Differences in ground potential between various devices in industrial environments create ground loop currents, which superimpose on signal lines to generate common-mode interference. Additionally, equipment such as variable frequency drives and motors generate electromagnetic noise during operation. This interference directly enters the PLC’s analog input ports, causing the acquired current signals to fluctuate, drift, or even exceed the device’s voltage tolerance range, resulting in the burnout of PLC modules.

Q: How does the QD-14 transmitter solve this problem? What benefits does it offer?

A: The QD-14 features a three-terminal electrical isolation design, providing complete electrical isolation between the input, output, and power supply circuits. With an isolation rating of up to 2500 V AC, it completely blocks the transmission paths of ground loop currents and common-mode interference while suppressing the impact of electromagnetic noise on signals. After implementation, the stability of signals acquired by the PLC is significantly improved, eliminating issues such as signal jumps and drift. It also prevents downstream equipment from being damaged by high-voltage interference, thereby reducing equipment maintenance costs and the risk of downtime.

2. Customer Pain Point: The on-site current range does not match the PLC’s input module, making direct acquisition impossible and requiring the additional configuration of wide-range sensors.

Q: What should be done if the on-site current exceeds the direct acquisition range of the PLC’s analog module?

A: The analog input modules of most PLCs only support low-range current (e.g., 0–20 mA) or voltage signals. They cannot directly acquire AC or DC currents of 0–20 A, 0–100 A, or even higher ranges found in industrial circuits. Direct wiring would cause the module to burn out, and non-contact measurement is not possible.

Q: How does the QD-14 transmitter resolve the range mismatch issue? What benefits does it offer?

A: The QD-14 supports multiple current input ranges (such as DC 0–20 A, AC 0–50 A, etc.) and can linearly convert AC or DC currents of any range into standard signals compatible with PLCs, such as 4–20 mA or 0–10 V, achieving “any current → standard signal” adaptation. There is no need to replace PLC modules or configure additional high-range sensors; it can be directly integrated into existing control systems, significantly reducing the cost and complexity of system retrofits.

3. Customer Pain Points: Traditional current transformers only support AC measurement and cannot measure DC current; they are also bulky and difficult to install.

Q: The site has both AC motor circuits and DC power circuits. How can current signals from both be collected simultaneously?

A: Traditional electromagnetic current transformers can only measure AC current and cannot sample DC current; purchasing separate DC current sensors increases equipment costs, and since installation methods vary across different models, wiring and maintenance become cumbersome.

Q: How does the QD-14 transmitter address the issue of AC/DC compatibility? What benefits does it offer?

A: The QD-14 employs a Hall-effect closed-loop measurement principle, enabling precise measurement of both AC and DC currents simultaneously. A single device can cover both AC and DC scenarios. It features standard 35mm DIN rail mounting, and its blue industrial housing fits the vast majority of control cabinets, eliminating the need for custom mounting brackets. Using the same transmitter for both AC and DC circuits reduces the variety of spare parts, thereby lowering procurement and maintenance costs.

4. Customer Pain Points: Complex on-site conditions and significant temperature fluctuations lead to increased current measurement errors, affecting production control accuracy

Q: Temperature fluctuations are significant in industrial environments, causing measurement errors in standard current sensors to increase. How can data accuracy be ensured?

A: Conventional current sensors are highly susceptible to temperature drift. In wide-temperature environments, linearity errors and zero-point errors increase significantly, causing collected current data to deviate beyond acceptable limits. This affects the control accuracy of automation systems and may even lead to loss of control over production process

parameters.
Q: How does the QD-14 transmitter ensure measurement accuracy in a wide temperature range? What benefits does this offer?
A: The QD-14 employs closed-loop Hall effect measurement technology and a high-precision linear correction circuit, achieving a measurement accuracy class of 0.2. With a temperature drift of ≤50 ppm/°C, it operates stably within a wide temperature range of -25°C to +70°C, consistently maintaining measurement errors within ±0.3%. Even when on-site temperatures fluctuate significantly, it ensures the accuracy of current data, providing reliable measurement data for automation control and preventing process failures and product quality issues caused by data deviations.

5. Customer Pain Points: Signals are prone to interference during long-distance transmission, resulting in signal attenuation or distortion, and failing to meet on-site wiring requirements
Q: The PLC control cabinet is located far from the field equipment. Direct transmission of low-current signals causes attenuation and interference. What should be done?
A: During long-distance transmission, current signals are affected by line impedance and electromagnetic interference, leading to signal attenuation and distortion. This causes a significant deviation between the signal acquired by the PLC and the actual current, making precise control impossible.
Q: How does the QD-14 transmitter solve the problem of long-distance signal transmission? What benefits does it offer?
A: The QD-14 outputs a standard 4-20mA current signal with extremely strong anti-interference capabilities, supporting transmission distances of up to 1,000 meters

or more without significant attenuation due to line impedance. Additionally, its three-terminal isolation design further suppresses electromagnetic interference during transmission, ensuring the signal remains undistorted over long distances. Once installed, it enables long-distance signal transmission between field devices and control cabinets without the need for additional signal amplifiers, making it suitable for the wiring requirements of various large-scale factories.

IV. Key Parameters & Specifications
4.1. Basic Electrical Parameters
Input Signal Type: DC/AC current, supports true RMS measurement
Input Range (customizable):
DC current: 0–1 A, 0–5 A, 0–10 A, 0–20 A, 0–50 A, 0–100 A, 0–200 A, etc.
AC Current: 0–1 A, 0–5 A, 0–10 A, 0–20 A, 0–50 A, 0–100 A, 0–200 A, etc.
Output Signal Type: Standard industrial analog signal
Current Type: 4–20 mA (default), 0–20 mA, 0–10 mA
Voltage Type: 0–5 V, 0–10 V, 1–5 V
Output Load Capacity:
Current Output: ≤500 Ω (4–20 mA signal)
Voltage Output: ≥2 kΩ
Measurement Accuracy Class: Class 0.2, Class 0.3 (Model shown in the figure is Class 0.3)
Linearity error: ≤±0.1% FS
Repeatability error: ≤±0.1% FS
Temperature drift: ≤±50 ppm/°C (within the range of -25°C to +70°C)
Response time: ≤300 ms (closed-loop Hall effect principle)
Ripple rejection ratio: ≥60 dB
Frequency response: DC to 1 kHz (suitable for both DC and power-frequency AC)

4.2 Isolation Performance Parameters
Isolation Type: Three-terminal electrical isolation (input circuit / output circuit / power supply circuit)
Isolation Strength: 2500 V AC (1 minute, no breakdown)
Insulation Resistance: ≥100 MΩ (tested at 500 V DC)
Common-Mode Rejection Ratio (CMRR): ≥100 dB
Differential-Mode Rejection Ratio (DMRR): ≥80 dB
Surge Immunity: ±2 kV (IEC 61000-4-5 standard)
Electrostatic Discharge Immunity: ±8 kV contact discharge, ±15 kV air discharge (IEC 61000-4-2 standard)

4.3 Power Supply & Power Consumption Parameters
Supply Voltage: 24 VDC (standard industrial power supply; acceptable range: 18 VDC to 30 VDC)
Typical Power Consumption: ≤1.5 W (at full load)
No-Load Power Consumption: ≤0.8 W
Power Distribution Output: No built-in power distribution output (Requires an external, independent 24V DC power supply)
Power Supply Ripple Suppression: ≥40dB
Reverse Polarity Protection: Built-in reverse polarity protection diodes; supports protection against incorrect polarity connection
Overvoltage Protection: Continuous withstand voltage of 35V DC; transient withstand voltage of 40V DC (≤1s)

4.4 Environmental Parameters
Operating Temperature Range: -25°C to +70°C
Storage Temperature Range: -40°C to +85°C
Operating Humidity Range: 10% RH to 90% RH (non-condensing)
Storage Humidity Range: 5% RH to 95% RH (non-condensing)
Protection Rating: IP30 (indoor installation, dust and splash proof)
Explosion-proof rating: No explosion-proof certification (For explosion-hazardous environments, use with intrinsically safe safety barriers; compatible models include Zener-type safety barriers and isolating safety barriers; the intrinsically safe circuit certification level must meet on-site requirements)
Vibration Resistance: 10–150 Hz, 0.75 mm amplitude, 2 hours in each of the X, Y, and Z directions (IEC 60068-2-6 standard)
Shock Resistance: 30g, 11 ms, 3 times in each of the X, Y, and Z directions (IEC 60068-2-27 standard)



4.5. Physical Parameters
Mounting Method: Standard 35mm DIN rail mounting (compatible with G-type rails)
Dimensions (refer to general specifications for the same series; to be adapted to the appearance you provide):
Length: Approx. 115mm
Width: Approx. 25mm
Height: Approx. 64mm
Cable entry hole diameter: Approx. 4mm/8mm/12mm/15mm (compatible with 0-20A/0-50A range cables; hole diameter for high-range models can be customized up to 15mm)
Weight: Approx. 120g (per unit)
Indicator light definitions:
PWR (Power Indicator): Green LED; remains lit when powered on to indicate normal power supply; turns off to indicate no power or power failure
No dedicated ALM alarm indicator (if alarm functionality is required, it can be implemented via over-range or under-range output signals fed back to the PLC)
Housing Material and Protection Details:
Housing Material: Blue flame-retardant ABS engineering plastic (UL94-V0 rating)
Protection Details: Terminal blocks are made of green flame-retardant PA66 material and feature anti-loosening screws; the housing is molded as a single piece with no exposed metal parts to prevent accidental electric shock; ventilation slots are provided on the top to prevent heat buildup in high-temperature environments
Terminal Definitions (as labeled in the diagram):
Terminal 10: 0V (Power Negative)
Terminal 12: 24+ (Power Supply Positive)
Terminals 7/8/9/11: Signal Output Terminals (OUT-, OUT+, corresponding to the positive and negative terminals of the output signal)

V. Application-Specific Selection Guide

5.1 Key Selection Criteria

1. Signal Type Selection

Prioritize selection based on the type of current being measured on-site. The QD-14 supports universal AC/DC measurement and can be used directly in both DC and AC circuits. For output signals, prioritize selection based on the receiving equipment at the back end. For PLC and DCS systems, 4–20 mA is the standard choice; for industrial control instruments and data acquisition cards, 0–5 V or 0–10 V voltage signals can be selected.

2. Channel Selection

For single-loop independent current monitoring, select the standard 1-in/1-out model. If a single current signal needs to be transmitted simultaneously to two control systems (e.g., local display + remote upload), choose the 1-in/2-out dual-output model to avoid redundant sensor installations.

3. Power Supply Selection

Industrial control cabinets are typically equipped with a standard 24 V DC power supply; therefore, select the default 24 V DC version. Unless there are specific power requirements, it is not recommended to choose non-standard power supply models to reduce on-site power adaptation costs and the risk of failure.

4. Selection Based on Explosion-Proof Requirements

For environments without flammable or explosive gases—such as general workshops, electrical distribution rooms, and smart manufacturing production lines—the standard QD-14 model is sufficient. For explosion-proof zones in industries such as chemicals, oil and gas, and pharmaceuticals, this must be specified in advance. These environments require the use of intrinsically safe barriers or custom explosion-proof versions; direct use of the standard model is prohibited.

5. Selection Based on Installation Environment

For standard indoor control cabinet installation, select the conventional blue-enclosed DIN-rail mounting model. In environments with high dust levels, high humidity, or light oil contamination, the QD-14 remains suitable but must be installed within a cabinet with a higher protection rating. Direct use is not recommended in outdoor open-air or highly corrosive environments; an additional protective enclosure must be provided.

5.2. Recommended Model Selection for Industry Applications

1. Chemical Industry Applications

Chemical production involves corrosive environments, flammable and explosive areas, and strong interference from variable-frequency equipment. The standard QD-14 three-terminal isolated model is the preferred choice. Signal output is primarily 4–20 mA, and the device must meet high isolation and anti-interference requirements. For explosion-proof sections, the safety barrier configuration must be confirmed in advance to ensure stable current monitoring without drift.

2. Power Industry Applications

For power monitoring scenarios such as substations, distribution rooms, low-voltage switchgear, and photovoltaic DC circuits, the QD-14 is suitable for both AC and DC current. Select the appropriate range based on the actual current magnitude. The standard 1-input, 1-output model is recommended, with a focus on using three-terminal isolation to protect relay protection devices, PLCs, and other equipment from damage caused by high-voltage crosstalk.

3. Metallurgy Industry Applications

Metallurgy sites feature numerous motors, dense arrays of variable frequency drives, extremely strong electromagnetic interference, and high ambient temperatures. Select the QD-14 Hall-effect closed-loop measurement model, which ensures stable measurement in high-current circuits through its high isolation strength and wide operating temperature range. The standard 4–20 mA output is recommended for compatibility with various industrial control systems and data acquisition devices.

4. Pharmaceutical Industry Applications

For automated equipment in pharmaceutical production areas, power distribution monitoring in cleanrooms, and current monitoring in water treatment systems, the QD-14 Blue Standard DIN Rail model is recommended. It features a simple, space-saving installation that meets the requirements of hygienic and clean environments. It provides stable, interference-free signals to ensure the real-time and accurate collection of production equipment operating parameters.

5. Smart Manufacturing Applications

Automated production lines, machinery, robot control cabinets, and warehouse logistics equipment: Select the QD-14 standard-range model. Powered by 24 VDC with a 1-input, 1-output configuration, it offers convenient installation suitable for dense cabinet layouts. It accurately monitors equipment operating currents to enable overload detection and operational status monitoring.

6. Water Treatment / Environmental Protection Applications

Current monitoring for equipment such as pumps, fans, and chemical dosing systems. The QD-14 AC/DC universal model is suitable for these applications. Designed to withstand humid industrial environments, it employs three-terminal isolation to block ground-loop interference, ensuring reliable transmission of remote monitoring signals and minimizing signal fluctuations and false alarms.

5.3 Common Selection Pitfalls

1. Incorrect Selection Due to Neglecting Isolation Levels

Focusing solely on measurement accuracy while overlooking the importance of three-terminal isolation can lead to the selection of products with low or no isolation in high-interference industrial environments. This may result in signal fluctuations, inaccurate data, or even damage to downstream equipment. The QD-14 must be selected in the full three-terminal isolation version; downgraded replacements are not permitted.

2. Incorrect Signal Range Selection Leading to Inoperability

If the actual measured current far exceeds the selected range, measurement saturation occurs with no output; conversely, selecting a range that is too wide results in insufficient accuracy for monitoring small currents. Before selection, the maximum operating current at the site must be accurately verified, and the corresponding QD-14 range must be matched with a 1.2x margin.

3. Abnormal Output Due to Neglected Load Matching

Failure to account for transmission line resistance and device input impedance, coupled with selecting a current output where the load exceeds 500Ω, causes signal attenuation and low output. When selecting a model, confirm the transmission distance and load size in advance to ensure the QD-14's output capacity meets on-site requirements.

4. Safety Hazards from Using Standard Models in Explosion-Proof Environments

Using standard, non-explosion-proof QD-14 units directly in flammable or explosive environments—without safety barriers or explosion-proof modifications—violates safety regulations and poses safety risks. For such scenarios, customized solutions or safety measures must be discussed and implemented in advance.

5.4 Customization Recommendations

1. Customized Signal Outputs

If the application requires non-standard output signals (e.g., 0–20 mA, 1–5 V), these can be customized based on the standard QD-14 model. For non-standard input ranges (e.g., 0–80 A, 0–150 A), internal parameters can be adjusted to achieve compatibility without altering the product's structure.

2. Customization for Non-Standard Operating Conditions

For operating temperatures outside the -25°C to +70°C range, requirements for higher protection ratings, or special power supply voltages such as 12V DC, the QD-14 can be customized for environmental adaptability while retaining the blue housing and three-terminal isolation structure to meet specific on-site requirements.

3. Multi-Channel Integration Customization

For applications requiring simultaneous monitoring of multiple current channels while minimizing installation space and wiring complexity, multi-channel integration modules can be customized based on the QD-14 series. These modules enable centralized acquisition and isolated output of 2 or 4 current channels, featuring unified power supply and installation, thereby improving cabinet space utilization.

4. Customization for Special Functions

For expanded capabilities such as alarm outputs, RS485 communication outputs, or dual mutually isolated independent outputs, solutions can be customized based on the QD-14 Hall effect measurement core. This maintains a consistent exterior design and ensures compatibility with existing installation methods.

VI: Installation and Commissioning Specifications

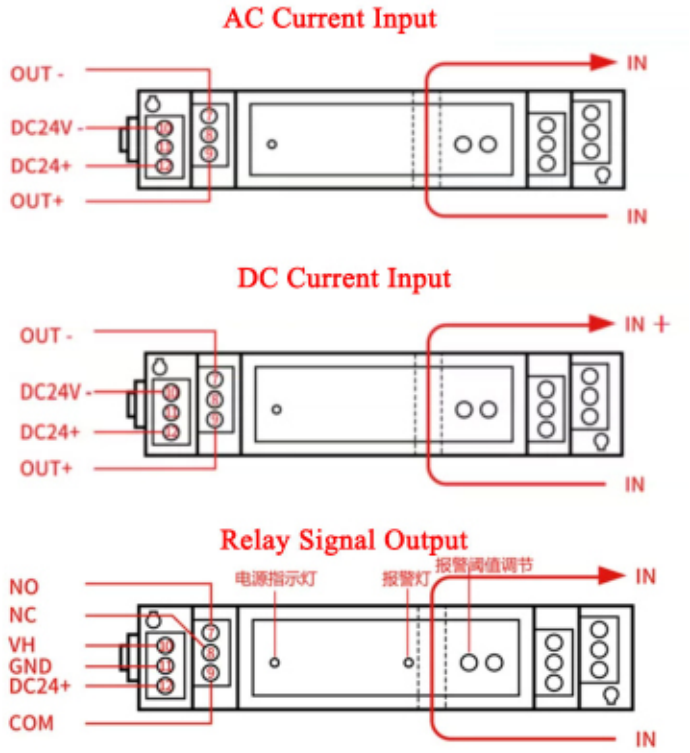
6.1 Pre-installation Preparation

1. Component Verification

Verify that the product model, measurement range, input/output types, and supply voltage match the order specifications. Confirm that the exterior features a standard blue housing with no damage, cracks, or deformed terminals.
Check that the product unit and terminal screws are complete inside the packaging, with no missing parts or impact damage.
Confirm that the specifications of auxiliary materials, such as matching wires, shielded cables, and rail mounting hardware, meet operational requirements.
2. Environmental Inspection
The installation location should be inside a control cabinet, away from direct sunlight, intense vibration, and corrosive gases.
Ambient temperature and humidity must be within the product's permissible range; ensure there is no condensation, standing water, or excessive dust or oil contamination.
Keep the unit away from high-interference, high-voltage equipment such as inverters, contactors, and transformers, and ensure sufficient space for heat dissipation and wiring.
3. Tool List
Phillips screwdriver, wire strippers, crimping pliers, multimeter (voltage/current range).
DIN rail pliers, electrical tape, heat-shrink tubing, shielded wire grounding terminals.
Standard current signal source or standard load resistor (for commissioning).
4. Safety Precautions
The on-site power supply must be disconnected before installation. Under no circumstances should wiring or disconnection be performed while the system is energized to prevent electric shock and equipment damage due to short circuits.
Wiring personnel must possess valid electrical certification and wear appropriate insulation protection.
Verify that the supply voltage is DC 24V; connecting to high-voltage power sources such as AC 220V is strictly prohibited.
Installation in explosion-proof zones must strictly comply with explosion-proof regulations and be performed by qualified personnel.

6.2 Standard Installation Steps
1. Mounting on DIN Rail
Align the latches on the back of the QD-14 transmitter with a standard 35mm DIN rail, then press down evenly to secure it.
When installing multiple units side-by-side, it is recommended to maintain a gap of ≥10mm between each unit to ensure adequate heat dissipation and wiring space.
There are no mandatory requirements regarding installation orientation; both vertical and horizontal installations are acceptable, provided they facilitate wiring.
Wiring Specifications (Strictly Separate Power / Input / Output)
Power Terminals: Connect to a 24V DC power supply; connect the positive terminal to the terminal marked "+24V" and the negative terminal to the "0V/GND" terminal.
2. Reversing the positive and negative terminals is strictly prohibited.
Input Terminals: Feed the cable to be measured through the cable entry hole in the center of the transmitter. For single-core cables, feed them through individually; for multi-strand cables, bundle them together before feeding through. Direction is not critical (suitable for both AC and DC).
Output Terminals: Connect to the PLC or instrument according to the labels. For current output, distinguish between OUT+ and OUT-; do not reverse them. For voltage output, similarly distinguish between positive and negative terminals.
Ensure all wire ends are stripped to an appropriate length and that screws are tightened evenly to prevent loose connections, disconnection, or short circuits.
4. Grounding Requirements
The transmitter housing does not require separate grounding; interference resistance is achieved through three-terminal isolation.
The shield of the shielded cable must be grounded at a single point; it is recommended to ground it at a single point on the instrument side of the control cabinet. Grounding at both ends to form a ground loop is strictly prohibited.
The cabinet's protective grounding must be reliably connected to earth to reduce overall electromagnetic interference.

6.3, Wiring Diagram



6.4 Power-On Debugging Procedure
1. No-Load Test
Connect the 24 VDC power supply and verify that the PWR indicator remains lit, indicating normal power supply.
When there is no input current, the output should be a zero-point signal (4 mA for 4–20 mA output, 0 V for 0–5 V output).
Use a multimeter to check that the output is normal, with no fluctuations, no overload, and no smoke or unusual noises.
2. Signal Calibration
Apply a standard known current, record the transmitter's output value, and compare it with the theoretical value to verify linear accuracy.
Gradually increase the current to full scale and observe whether the output changes linearly in sync; there should be no stuttering, saturation, or drift.
For long-distance transmission scenarios, measure the final signal at the instrument end to confirm there is no significant attenuation.
3. Indicator Light Status Assessment
PWR green light is constantly on: Power supply is normal, and the device is operating normally.
Indicator light is off: Check if the power supply is connected, if the voltage is normal, if the polarity is reversed, or if the terminals are loose.
No ALM alarm indicator; abnormal conditions are identified through abnormal output signals.
4. Calibration Method
The QD-14 has undergone high-precision calibration at the factory; no on-site recalibration is required.
If zero-point or full-scale deviations occur, a qualified technician must use standard equipment to fine-tune the internal calibration potentiometer; unauthorized personnel must not adjust it arbitrarily.

6.5 Installation Precautions
Overvoltage and incorrect phase supply are strictly prohibited.
Do not connect to AC 220V, AC 380V, or power sources outside the DC 18–30V range, as this will directly burn out the internal circuitry.
Reversing the positive and negative terminals of the power supply is strictly prohibited. Although reverse-polarity protection is provided, prolonged reverse connection may still damage components.
Avoid High-Voltage Interference and Wiring Errors
Transmitter signal cables must not be routed in the same conduit or cable tray as high-voltage power lines; maintain a minimum separation of 20 cm.
Do not connect high-voltage input lines directly to signal or power terminals to prevent high-voltage breakdown.
Do not route multiple circuits with different phase currents through the

same cable entry hole, as this will cause severe measurement distortion.
Protection Against Humidity and Harsh Environments
Do not install the device directly in environments with condensation, standing water, or water spray; it must be housed in a sealed control cabinet.
In high-humidity or highly corrosive environments, additional moisture-proof and anti-corrosion measures must be taken; otherwise, terminal oxidation and reduced insulation may occur.
Do not stack multiple units closely together in high-temperature, enclosed, and unventilated spaces to prevent overheating, which may result in reduced accuracy or damage.

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 device's PWR power indicator light. A steady green light indicates normal power supply and that the device is operational.
If the indicator light is off or flashing, immediately check the supply voltage, whether the terminal blocks are loose, and whether there are any abnormalities in the power circuit.
This model does not have an ALM alarm indicator; abnormal conditions are primarily determined by the output signal, so there is no need to check for alarm lights during inspections.

2. Monitoring Signal Stability

Use a PLC, industrial control screen, or multimeter to view the current output value in real time and observe for abnormalities such as fluctuations, drift, or sudden changes in magnitude.
Compare the actual operating current of the equipment with the transmitter's output value to determine if there are significant deviations or irregular fluctuations.
Pay close attention to whether the signal remains stable during inverter start/stop and load switching, ensuring there are no sudden changes, zero-reset events, or out-of-range overshoots.

3. Temperature and Humidity Monitoring

Verify that the temperature inside the transmitter's installation cabinet remains within the normal operating range of -25°C to +70°C, and avoid placing the unit near radiators or heat-generating components.
Check the cabinet for condensation, water accumulation, or signs of moisture to prevent reduced insulation and signal interference caused by excessive humidity.
During hot seasons, ensure adequate cabinet ventilation to prevent the equipment from operating in a sealed, high-temperature environment for extended periods.

7.2. Regular Maintenance Plan

1. Recommended Cleaning Intervals

Standard industrial environments: Clean dust from the transmitter housing and terminal areas every 6 months.
Environments with high dust levels or light oil contamination: Clean every 3 months using a dry, soft cloth or compressed air; do not use water or corrosive cleaning agents.
Always disconnect power before cleaning to avoid the risk of short circuits or electric shock.

2. Wiring Tightness Inspection

Every 6 months, inspect and tighten the screws on the power terminals and signal output terminals to prevent loose connections or contact loss caused by vibration.
Pay special attention to the positive and negative power supply terminals, positive and negative output terminals, and shield grounding terminals to ensure there is no oxidation, charring, or signs of overheating.
If oxidation or discoloration is found on the terminals, sand them down or replace the terminals promptly to prevent signal abnormalities caused by poor contact.

3. Recommendations for Accuracy Recalibration

Standard operating conditions: Perform an accuracy calibration once a year using a standard current source or standard load to compare measurement errors.
High-precision control applications, critical circuits in chemical/power industries: Perform accuracy retesting every 6 months.
If deviations exceed the allowable range, contact the manufacturer for factory recalibration; non-professionals are advised not to adjust internal parameters on their own.

7.3 Long-Term Maintenance Tips

1. Dust and Moisture Protection Measures

Keep the control cabinet closed and locked at all times to minimize the entry of dust, moisture, and metal particles, thereby extending the service life of the blue enclosure and internal circuitry.
In high-humidity environments, place desiccants inside the cabinet or install a dehumidifier to prevent condensation from causing short circuits, electrical leakage, or signal interference.
Prevent water and oil from entering through cabinet gaps. Although the blue enclosure is made of flame-retardant material, prolonged immersion or corrosion can degrade its insulation properties.

2. Long-Term Interference Mitigation

Use shielded cables for all signal lines, ensuring the shield is grounded at a single point to avoid ground loops that introduce interference.
Transmitter wiring must be routed separately from high-voltage power lines and variable frequency drive cables, maintaining a minimum distance of 20 cm; they must not share the same cable tray or conduit.
The cabinet must be reliably grounded, with grounding resistance meeting industrial control standards, to further enhance the anti-interference effectiveness of the three-terminal isolation.

3. Protection Against Extreme Environments

Low-temperature environments: Ensure the cabinet temperature remains above -25°C; if necessary, install a low-temperature heating module to prevent accuracy drift.
High-Temperature Environments: Enhance ventilation and heat dissipation; when installing multiple units side-by-side, maintain spacing to prevent heat buildup.
High-Vibration Environments: Periodically inspect rail clips and terminal blocks; implement anti-vibration mounting measures as needed.
Corrosive Environments: Install corrosion-resistant protective covers or use corrosion-resistant terminals to prevent chemical gases from corroding the enclosure and wiring connections.

VIII: Troubleshooting & Emergency Response

8.1 List of Common Faults

No analog signal output after powering on the device; no data feedback from the downstream PLC or instruments.
The measurement signal drifts continuously; values are unstable, fluctuating between high and low; data fluctuates significantly under static load.
Abnormal power indicator behavior, including the indicator not lighting up, dim lighting, or intermittent flashing.
Severe electromagnetic interference at the site causes measurement waveform distortion and erratic readings that do not match the actual current.
Signal range exceeded or output saturated; the load operates normally, but the transmitter's output remains fixed at the maximum value.
After prolonged operation, terminals overheat and insulation deteriorates, leading to intermittent disconnection faults.

8.2 Analysis of Failure Causes

Wiring errors: Reversed polarity of power supply, mixed-up input and output terminals, shielding wire grounded at both ends, or power lines mixed with signal lines.
Power supply abnormalities: Supply voltage exceeds the standard range of DC 18V–30V, excessive power supply ripple, loose power connections, or insufficient power supply capacity.
Signal Overload: Actual measured current exceeds the product's rated range; output load resistance exceeds specifications; output circuit short-circuit or incorrect connection to high-voltage power.
Environmental Interference: Installation location adjacent to inverters, contactors, or high-frequency equipment; ground potential differences causing ground loop interference; reduced insulation due to dust or moisture.
Equipment Damage: Prolonged operation at excessive temperatures; high-voltage surges causing breakdown of isolation circuits; physical impact damaging internal Hall elements; circuit aging due to long-term corrosion.

8.3 Step-by-Step Troubleshooting

1. Fault: No output signal

Troubleshooting steps: First, disconnect the power supply. Check the terminal wiring definitions one by one to ensure the positive and negative terminals of the 24V power supply are not reversed. Re-measure the actual supply voltage to rule out undervoltage or power failure issues.

Check the output lines for short circuits or open circuits, and inspect the PLC analog terminals for damage. Confirm that the tested cables pass through the through-holes correctly, with no missing or misplaced connections.
Remedial Actions: Correct any incorrect wiring and retighten all terminal screws; replace with a stable, compliant 24V DC industrial power supply; repair damaged signal cables and replace any faulty downstream data acquisition modules.
Emergency Workaround: In urgent on-site situations, temporarily replace the unit with a spare QD-14 transmitter of the same measurement range and output specifications to quickly restore system monitoring.

2. Issue: Signal drift, unstable readings
Troubleshooting steps: Check the temperature and humidity inside the control cabinet to ensure there is no condensation or heat buildup; verify the grounding method of the shielded cables to rule out double-ended grounding; check for high-frequency interference from nearby high-power variable-frequency equipment; verify that the load impedance meets the product specifications.
Remedial Actions: Modify the shielding layer to single-point grounding; route high- and low-voltage circuits in separate cable trays, maintaining safe clearance distances; install ventilation and dehumidification measures in the cabinet; replace load equipment with impedance-matched devices to eliminate signal drift caused by small loads.
Emergency Workaround: Temporarily add signal isolation terminals for auxiliary filtering to stabilize data acquisition in the short term; implement comprehensive wiring rectification at a later stage.

3. Fault: Abnormal Indicator Lights
Troubleshooting Steps: If the indicator lights do not illuminate at all, focus on checking for power supply open circuits, loose terminals, or reversed polarity; if the lights are dim or flickering, check for insufficient power supply voltage, excessive power supply ripple, or poor circuit contact.
Remedial Measures: Reconnect to a compliant industrial DC power supply, clean oxidation from terminals, and tighten connections; install a power supply filter module to clean up the power supply circuit.
Emergency Workaround: Use an external regulated switching power supply for temporary power to ensure the device powers on normally and operates stably.

4. Issue: Interference, Distortion, or Erratic Readings
Troubleshooting Steps: Verify that the product's three-terminal isolation function is working properly; investigate common-mode interference caused by multiple grounding points on-site; check whether the equipment housing and cabinet are reliably grounded; verify that signal cables are not routed parallel to high-voltage power lines.
Remedial Actions: Leverage the product's native three-terminal isolation to optimize the overall grounding system; replace signal cables with shielded twisted-pair cables and route them away from high-voltage equipment; install surge absorbers to mitigate industrial electromagnetic pulse interference.
Emergency Workaround: Temporarily reduce the operating frequency of nearby variable-frequency equipment to minimize transient electromagnetic radiation and temporarily maintain measurement accuracy.

5. Fault: Signal Overload, Output Saturation
Troubleshooting Steps: Compare the product's nameplate range with the actual maximum operating current on-site; check the output circuit for miswiring or load short circuits.
Remedial Measures: Replace with a QD-14 model with a higher custom range; resolve output short circuits and ensure the downstream load resistance remains within the specified range.
Emergency Workaround: Temporarily reduce the device's operating load current to avoid over-range measurements while awaiting a model replacement.

8.4. After-Sales Repair Guidelines
1. Criteria for Determining Equipment Failure
If, after rechecking the wiring, testing the power supply, rectifying the environmental conditions, and inspecting the circuitry, the equipment still fails to power on normally, produces no signal output, exhibits measurement errors that significantly exceed the tolerance limits, has burned-out internal circuits, or shows deformation or damage to the housing, the issue is deemed a failure of the equipment itself, and a repair request may be submitted.
2. Repair Process
Immediately record the product's full model number, serial number, purchase batch, on-site operating conditions, fault symptoms, and take photos of the issue; compile information such as wiring configurations, power supply parameters, and the industry environment in which the product is used; contact the company's after-sales technical support to submit a description of the fault and the relevant documentation; technical personnel will provide remote assistance for a secondary troubleshooting. If the issue cannot be resolved remotely, request to return the unit for inspection, repair, or replacement.
3. Warranty Coverage
The Qidian QD-14 blue-cased three-terminal isolated Hall-effect current transmitter is covered by standard industrial product warranty service. Under normal operating conditions, equipment failures not caused by human error, improper wiring, external damage, or misuse in harsh corrosive environments will be repaired or replaced free of charge within the warranty period. Damage resulting from human factors—such as overvoltage supply, unauthorized disassembly or modification, outdoor use without protection, or improper use in explosion-proof zones—is not covered by the free warranty and will incur repair costs.
4. Basic Usage Guidelines
Do not open the device housing without authorization, as this may damage the isolation structure and seal. Do not adjust internal potentiometers or modify the circuitry, as this may compromise measurement accuracy and isolation protection, thereby affecting your warranty rights.