3-Phase AC Current Transducer

I. Product Definition

The Qidian KXT2731 Three-Phase AC Current Transmitter (Black Housing Model) is a high-precision front-end sensing device specifically designed for the acquisition and isolation conversion of three-phase AC current signals in industrial environments. Through its built-in three-channel current sensing unit, it proportionally and linearly converts 0–800 A AC current signals from three-phase AC circuits into standard DC signals (4–20 mA), while simultaneously providing electrical isolation between the input, output, and power supply. It delivers safe, stable, and interference-resistant current measurement signals to industrial control systems such as PLCs, DCSs, and digital display meters, and is widely used for three-phase current monitoring and control in applications including power generation, chemical processing, water treatment, and automated production lines.

II. Working Principle

1. Current Sensing Stage: The three-phase AC currents pass through the transmitter's three independent cable entry ports. The internal Hall effect sensor unit detects the magnetic field generated by the AC currents and converts the magnetic field signal into a weak electrical signal.

2. Signal Conditioning Stage: The weak induced signal enters a high-precision signal conditioning circuit, where it undergoes amplification and filtering to eliminate noise caused by on-site electromagnetic interference, thereby restoring a clean current signal waveform.

3. Isolation and Conversion Stage: The conditioned signal enters the electrical isolation module, which electrically isolates the high-voltage input circuit from the low-voltage output circuit, blocking common-mode interference and ground-loop interference; Subsequently, a linear conversion circuit proportionally converts the AC current signal into a standard DC signal (e.g., 4–20 mA DC).

4. Signal Output Stage: The converted standard DC signal is output to the control system via the green terminal. Meanwhile, the transmitter's built-in power indicator (supported in some versions) provides feedback on the power supply status, ensuring intuitive monitoring of the device's operational status.

III. Core Value

3.1 Overview of Core Value

The core value of the Qidian KXT2731 Three-Phase AC Current Transmitter lies in addressing the three major pain points in three-phase current signal acquisition at industrial sites: interference, safety, and compatibility. It provides industrial control systems with high-precision, high-stability, and high-security current monitoring signals, ensuring the reliability of equipment operation and data acquisition.

3.2 Pain Points and Solutions

Q: Electromagnetic interference in industrial environments can cause fluctuations and distortion in the three-phase current signals collected by PLCs, affecting equipment control and data analysis. How can this be resolved?

A: The Qidian KXT2731 three-phase AC current transmitter features a built-in, independent three-channel electrical isolation unit. This unit achieves three-point electrical isolation between the high-voltage input circuit, the low-voltage output circuit, and the power supply circuit. It effectively blocks electromagnetic interference and ground loop interference generated by on-site equipment such as motors and inverters, ensuring stable output signals without fluctuations and preventing misjudgments by the control system or data distortion.

Q: Connecting three-phase high-voltage current signals directly to a PLC poses a safety risk of high-voltage current entering the low-voltage circuit, which could burn out control equipment or even cause safety accidents. How can this be resolved?

A: The Qidian KXT2731 employs a through-hole, non-contact sensing design. The three-phase AC current passes through the transmitter via the through-holes, eliminating the need for direct wiring and achieving physical isolation between the high-voltage circuit and the transmitter's internal circuitry; At the same time, the three-terminal isolation design completely cuts off the path for high-voltage current to conduct to the low-voltage side, preventing high-voltage current from entering the control circuit at the source. This protects the safety of low-voltage equipment such as PLCs and digital displays, thereby reducing on-site safety hazards.

Q: Different brands of PLCs and DCS systems have varying requirements for the type and range of current acquisition signals. How can we resolve the issue of incompatibility that prevents direct connection?

A: The Qidian KXT2731 uniformly converts three-phase AC current signals into industrial-standard DC signals (such as 4–20 mA DC), making it compatible with the analog input modules of the vast majority of PLCs, DCS systems, digital displays, and other control systems. It eliminates the need for additional conversion devices, resolves signal compatibility issues between different systems, and reduces system integration complexity and costs.

Q: Collecting three-phase current signals requires installing three single-channel transmitters simultaneously, resulting in complex wiring, large installation footprint, poor consistency among multiple devices, and cumbersome maintenance. How can this be resolved?

A: The Qidian KXT2731 features an integrated three-channel design, allowing a single device to simultaneously collect three-phase current signals. It requires only a single installation, a single power supply, and three outputs, significantly simplifying field wiring and saving space in the control cabinet; Additionally, the channel consistency of a single device far exceeds that of multiple single-channel devices, reducing the workload of future maintenance and minimizing potential failure points.

Q: On-site current signals fluctuate significantly, and signal accuracy is insufficient, preventing the system from promptly detecting faults such as equipment overloads or phase loss. This affects equipment protection and fault troubleshooting. How can this be resolved?

A: The Qidian KXT2731 employs high-precision signal conditioning and linear conversion circuits, ensuring high linearity and minimal error in current signal conversion. The output signals accurately reflect real-time changes in three-phase currents, enabling the system to perform real-time monitoring, overload alarms, and phase loss detection. This helps users promptly identify equipment anomalies, proactively mitigate failure risks, and ensure stable equipment operation.

IV. Key Product Parameters & Specifications

4.1 Basic Electrical Parameters

Input Signal

Input Type: Three-phase AC current, through-wire non-contact sensing

Rated Input Current: AC 0–20 A (independent sensing per phase, three-channel synchronization)

Input Frequency: 45 Hz–65 Hz (compatible with 50/60 Hz AC power systems)

Overload Capacity: 1.2 times rated current for continuous operation; 10 times rated current for short-term surges (≤1 s)

Output Signal

Output Type: Standard DC current signal (independent output per phase)

Standard Output Range: DC 4–20 mA (default linear correspondence with input 0–20 A)

Load Capacity: ≤500Ω (Maximum load impedance to ensure output signal accuracy)

Linearity Error: ≤±0.2% FS (Full-scale linearity error)

Repeatability Error: ≤±0.1% FS

Response Time: ≤100ms (Response speed to step changes in input current)

Ripple and Noise: ≤10mVpp (Ripple and noise level of the output signal)

4.2 Isolation Performance Parameters

Isolation Architecture: Three-channel fully isolated design (mutual isolation between input circuit, output circuit, and power supply circuit)

Isolation Withstand Voltage

Input side to output side: AC 2500 Vrms (1 minute, no breakdown)

Input side to power supply side: AC 2500 Vrms (1 minute, no breakdown)

Output side to power supply side: AC 1500 Vrms (1 minute, no breakdown)

Isolation resistance: ≥1000 MΩ (under DC 500 V test conditions)

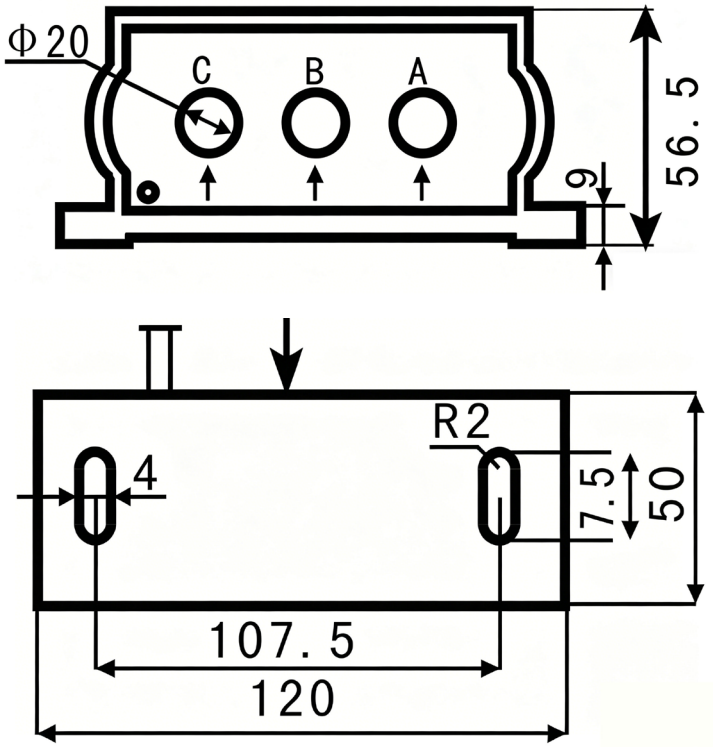
Common-Mode Rejection Ratio (CMRR): ≥100 dB (effectively

suppresses on-site common-mode interference)
Immunity: Complies with the GB/T 17626 industrial electromagnetic compatibility standard; resistant to electromagnetic interference and ground loop interference generated by devices such as inverters and motors

4.3 Power Supply & Power Consumption Specifications
Power Supply: Single-source DC power supply
Rated Supply Voltage: DC 24V (Standard industrial power supply)
Supply Voltage Range: DC 18V–30V (Adaptable to on-site power supply voltage fluctuations)
Polarity Protection: Built-in reverse polarity protection circuit to prevent equipment damage caused by reversed polarity
Full-Load Power Consumption: ≤2.5W (Maximum power consumption when all three phases are operating at full load)
Power Distribution Output: No additional power distribution output; supplies power only to its own circuitry
Power Supply Ripple Suppression: ≥60dB (Suppresses ripple interference in the power supply circuit)

4.4 Environmental Adaptation Parameters
Operating Temperature Range: -10°C to +60°C (standard industrial environment); Extended version supports -25°C to +70°C (custom option)
Storage Temperature Range: -40°C to +85°C
Operating Humidity Range: 10% RH to 90% RH (non-condensing)
Storage Humidity Range: 5% RH ~ 95% RH (non-condensing)
Protection Rating: IP30 (enclosure protection against ingress of solid foreign objects larger than 2.5 mm in diameter; suitable for indoor control cabinet installation)
Explosion-Proof Rating: Non-explosion-proof type; suitable for general industrial environments. For explosion-proof applications, must be used in conjunction with an intrinsically safe barrier (compatible with mainstream intrinsically safe barrier models on the market)
Vibration Resistance: Complies with GB/T 2423.10 standard; operates stably under vibration conditions of 10–150 Hz, 0.5g
Installation Altitude: ≤2000 m (derating required above 2000 m)

4.5. Physical Parameters
Mounting Method: Standard threaded mounting
Enclosure Material and Protection Details
Housing Material: Black flame-retardant ABS engineering plastic, UL94 V-0 flame-retardant rating, featuring anti-aging, insulating, and oil-resistant properties
Cable Entry Protection: Internal insulated sleeve prevents direct contact between high-voltage wires and the housing, enhancing electrical safety
Terminal Protection: Green pluggable terminals with anti-loosening screw design to prevent connection loosening caused by on-site vibrations
Enclosure Protection: One-piece molded enclosure with dust-proof design at the seams to minimize dust ingress into the internal circuitry
Dimensions (L × W × H): Approx. 120 mm × 50 mm × 56.5 mm (excluding protruding terminal blocks)
Weight: Approx. 250g (excluding packaging)
Indicator Light Definition: The device has no additional indicator lights; its operational status can be determined via output signals collected by the PLC
Cable Entry Hole Specifications: Single hole with an inner diameter of approx. 20mm, suitable for three-phase AC conductors with a cross-sectional area ≤10mm²



V. Application-Specific Selection Guide
5.1 Key Selection Criteria
Signal Type: Confirm that the on-site input is a three-phase AC current signal. The KXT2731 supports 0–20 A AC through-wire acquisition and outputs a standard 4–20 mA DC signal by default. If there are special signal requirements on-site, please contact us in advance to discuss a customized solution.

Number of Channels: The KXT2731 features a fixed three-channel design, enabling a single unit to simultaneously acquire three-phase current signals. Each phase provides an independent output signal, supporting simultaneous monitoring of both balanced and unbalanced three-phase circuits without the need for additional channel expansion.

Power Supply: The device supports a standard 24V DC industrial power supply by default, compatible with the DC power distribution in most control cabinets. If a 24V DC power source is unavailable on-site, please contact us in advance to discuss custom versions compatible with other supply voltages.

Explosion-Proof Requirements: The KXT2731 is a non-explosion-proof general-purpose model suitable only for standard industrial environments. For use in explosion-hazardous areas such as chemical or pharmaceutical facilities, it must be used in conjunction with an intrinsically safe barrier or a custom explosion-proof certified version of the device.

Installation Environment: Ensure the installation location is an indoor control cabinet compatible with standard 35mm DIN rail mounting. If installed in harsh environments with high humidity, high dust levels, or strong vibrations, verify that the protection rating and temperature/humidity ranges are suitable. If necessary, select an extended temperature/humidity version or install a protective enclosure.

Range Selection: Select the appropriate range based on the actual operating current of the on-site three-phase circuit. The standard range for the KXT2731 is AC 0–20 A. If the on-site current exceeds this range, please contact us in advance to customize a version with a different range.

Load Matching: Confirm the load impedance of the analog input modules in control systems such as PLCs and DCS. When the device outputs a DC 4–20 mA signal, the maximum supported load impedance is ≤500 Ω. If the load exceeds this range, it may cause signal distortion; compatibility must be evaluated in advance.

5.2. Recommended Selection for Industry Applications

1. Chemical Industry Applications: For current monitoring of three-phase motors and pump equipment during chemical production processes, we recommend the standard KXT2731 three-phase AC current transmitter. When used in conjunction with an intrinsically safe barrier, it provides electrical isolation between high-voltage circuits and control systems. This setup also protects against the effects of corrosive gases and electromagnetic interference on signal acquisition, ensuring stable transmission of operational current data and providing a reliable basis for process parameter adjustment and equipment overload protection.

2. Power Industry Applications: For three-phase current monitoring in low-voltage power distribution systems and switchgear, we recommend the standard KXT2731 three-phase AC current transmitter. Its three-terminal isolation design blocks ground loop interference, while its three-channel simultaneous acquisition of three-phase current signals enables three-phase balance monitoring, current overload alarms, and fault diagnosis in power distribution circuits, meeting the power system's stringent requirements for data acquisition accuracy and stability.

3. Metallurgy Industry Applications: For current monitoring of fans and motors driven by variable frequency drives (VFDs) in metallurgical production lines, the KXT2731 three-phase AC current transmitter with extended temperature and humidity capabilities is recommended. This model is designed to withstand the harsh conditions of metallurgical sites—including high temperatures, high dust levels, and strong electromagnetic interference. By simultaneously collecting three-phase current signals across all three channels, it provides precise data support for motor current balance control, overload protection, and energy consumption statistics.

4. Pharmaceutical Industry Applications: For three-phase current monitoring in pharmaceutical production equipment (such as mixing tanks and transfer pumps), the standard KXT2731 three-phase AC current transmitter is recommended. Designed for clean installation environments within control cabinets, it ensures stable acquisition and isolated conversion of current signals. It outputs a standard 4–20 mA DC signal to meet the analog input requirements of PLC control systems in the pharmaceutical industry, thereby ensuring the precision of automated control during production processes.

5. Smart Manufacturing Scenarios: For current monitoring of three-phase servo motors and drive equipment in automated production lines and robotic workstations, the standard KXT2731 three-phase AC current transmitter is recommended. Through three-channel synchronous acquisition, it enables real-time monitoring and feedback of three-phase currents, providing data support for equipment current closed-loop control, anomaly alarms, and troubleshooting. Additionally, the three-terminal isolation design prevents electromagnetic interference between field devices from affecting control signal transmission.

5.3 Common Selection Pitfalls

Pitfall 1: Ignoring Isolation Levels and Focusing Solely on Signal Conversion Functions

In industrial field environments, equipment such as variable frequency drives and motors generates significant electromagnetic interference and ground loop interference. If the isolation level of the equipment is ignored and transmitters with no isolation or low isolation levels are selected, this can lead to output signal fluctuations and distortion, or even cause high-voltage currents to enter low-voltage circuits, potentially burning out PLC equipment. The KXT2731 features a three-terminal isolation design, with the input, output, and power supply circuits isolated from one another, effectively preventing such issues.

Misconception 2: Selecting the wrong signal range without considering the range of current fluctuations at the site

When selecting a model, if the range is chosen based solely on the equipment's rated current without considering short-term current surges or overload fluctuations at the site, an undersized range may cause the transmitter to operate in an overloaded state for extended periods, thereby affecting equipment lifespan and signal accuracy. Conversely, an oversized range may result in insufficient resolution in the low-current signal range, compromising monitoring accuracy. The standard range of the KXT2731 is 0–800 A AC. When selecting a model, a comprehensive assessment must be made based on the operating range of the on-site current and the system's overload capacity.

Misconception 3: Neglecting load matching, leading to output signal distortion

Failing to evaluate the load impedance of the PLC or DCS system's analog input modules before selecting a transmitter. If the load impedance exceeds the transmitter's maximum supported range, it will cause a decline in the linearity of the DC 4–20 mA output signal and an increase in error, affecting the system's accuracy in acquiring current signals. The KXT2731 supports a maximum output signal load impedance of ≤500Ω; when selecting a model, verify the load parameters of the control system.

Misconception 4: Selecting a general-purpose model for explosion-proof environments without pairing it with a safety barrier or a customized explosion-proof version

In explosion-proof zones such as chemical and pharmaceutical facilities, directly using non-explosion-proof general-purpose transmitters poses safety hazards and violates the regulations for electrical equipment in explosion-proof areas. In such scenarios, the general-purpose KXT2731 must be used in conjunction with an intrinsically safe barrier, or a custom explosion-proof certified version must be selected to meet the safety requirements for use in explosion-proof zones.

5.4 Customization Recommendations

1. Custom solutions for special signals: If the site has three-phase AC current signals with non-standard ranges (e.g., AC 0–50 A, AC 0–100 A), a customized KXT2731 three-phase AC current transmitter can be designed. This involves adjusting the sensing range and signal conversion ratio of the internal Hall sensor unit to achieve signal acquisition within the corresponding range and standard DC 4–20 mA output; Other output signal types (e.g., DC 0–5 V, DC 0–10 V) can also be customized as needed to meet the input requirements of specific control systems.

2. Custom Solutions for Non-Standard Operating Conditions: For non-standard operating conditions such as high temperature, low temperature, high humidity, severe vibration, and high dust levels, we can customize the KXT2731 device with extended temperature and humidity ranges by adjusting the operating temperature and humidity limits of the internal circuitry, or by installing special protective enclosures and using ruggedized terminal blocks to enhance the device's adaptability to harsh environments; For environments with strong electromagnetic interference, we can optimize isolation circuits and filtering designs to enhance the device's interference resistance.

3. Multi-Channel Integrated Customization Solutions: If there is a need for monitoring multiple three-phase current circuits on-site, we can customize integrated transmitters capable of collecting data from multiple three-phase current circuits. By integrating multiple three-channel acquisition units into a single device, we achieve synchronous acquisition and isolated conversion of three-phase current from multiple circuits, reducing the number of devices in the control cabinet and simplifying wiring, installation, and maintenance processes. We can also customize solutions for grouped isolation of multi-channel output signals to prevent signal interference between different circuits.

4. Special Installation and Interface Customization Solutions: To accommodate specific installation space requirements, the external dimensions of the KXT2731 device can be adjusted to fit non-standard installation spaces; To address specific on-site wiring requirements, we can customize terminal block types (e.g., screw-type, plug-in, or anti-loosening) or adjust the position and layout of terminal blocks to accommodate on-site wiring methods; versions with indicator lights can also be customized, adding power and signal status indicators to facilitate quick on-site assessment of the device's operational status.

VI. Installation and Commissioning Guidelines

Applicable Product: Qidian KXT2731 Black Housing, Three-Terminal Isolated, Three-Phase AC Current Transmitter

6.1. Pre-installation Preparation

1. Component Verification

Upon delivery, inspect the exterior of the unit to ensure the black housing is free of damage, cracks, or deformation. Check that the pluggable terminal blocks are complete and intact, with no missing parts or stripped threads. Verify that the product model is KXT2731, the three-terminal isolation configuration, and the three-phase measurement specifications match the procurement requirements, ensuring no model mix-ups or incorrect shipments.

2. Environmental Inspection

Confirm that the installation area is an indoor, sealed control cabinet environment. Ensure that the ambient temperature and humidity fall within the equipment's rated range, and that there is no condensation, strong corrosive gases, or significant dust accumulation. Keep the unit away from strong electromagnetic emission sources such as variable frequency drives, high-power motors, and high-frequency contactors, and avoid high-temperature heat sources as well as areas exposed to rain or water.

3. Tool List

Prepare a Phillips-head insulated screwdriver, fine-nose wire strippers, insulated electrical tape, a multimeter, standard 35mm DIN mounting rails, and cold-pressed terminal blocks. During the commissioning phase, provide a signal tester or PLC analog module for signal verification and calibration.

4. Safety Precautions

Before installation, the site's high-voltage power supply and control power must be disconnected; strictly follow power-off procedures. Route the high-voltage three-phase main circuit and the low-voltage control circuit separately. Wear insulated protective gear throughout the entire operation. Do not insert or remove terminal blocks while the system is energized to avoid the risk of electric shock and module burnout. Strictly distinguish between high-voltage input terminals and low-voltage power/output terminals to prevent incorrect or mixed connections.

6.2 Standard Installation Steps

1. Rail Mounting

Use industrial-standard 35mm DIN rails and pre-install them in the designated locations inside the control cabinet; align the rail latches on the back of the KXT2731 with the rail slots, press down vertically to secure, and gently shake the device to confirm the latches are locked, with no looseness or displacement; under vibration conditions, anti-disengagement latches may be installed for reinforcement.

2. Wiring Specifications (Terminal Zone Segmentation)

The device terminals are strictly divided into three main zones: power supply terminals, three-phase current input cable entry zone, and analog signal output terminals.

Power Supply Terminals: Connect uniformly to a 24V DC power supply. Strictly distinguish between positive and negative terminals; connect the positive terminal to the + terminal and the negative terminal to the - terminal. Reverse connections are strictly prohibited.

Input Section: Three-phase high-voltage AC cables must be routed independently through the device's dedicated Phase A, Phase B, and Phase C cable entry ports. Non-contact inductive sensing is used; no wiring is required—simply allow the wires to pass through naturally. Do not strip the wires or touch the internal sensing components.

Output Terminals: Three 4–20 mA analog signal outputs correspond to the three phases, respectively connecting to the analog input terminals of downstream PLCs, DCS systems, and digital display instruments. Signal lines must be paired one-to-one; daisy-chaining, parallel connections, or mixed usage are strictly prohibited.

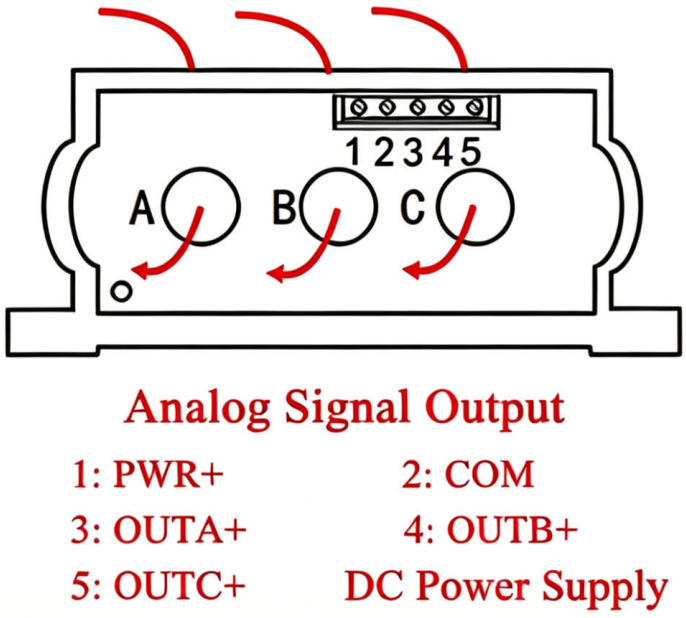
3. Grounding Requirements

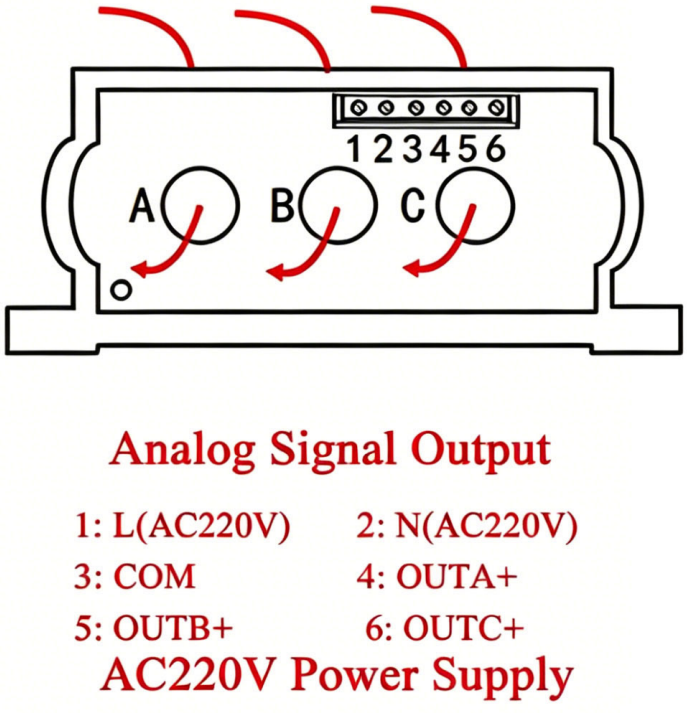
The entire control cabinet must be reliably grounded for overall protection, with the cabinet grounding resistance meeting industrial standards. The single-layer shield of signal shielded cables must be grounded at one end, uniformly grounded on the control system side; the shield on the transmitter side must remain floating and not grounded.

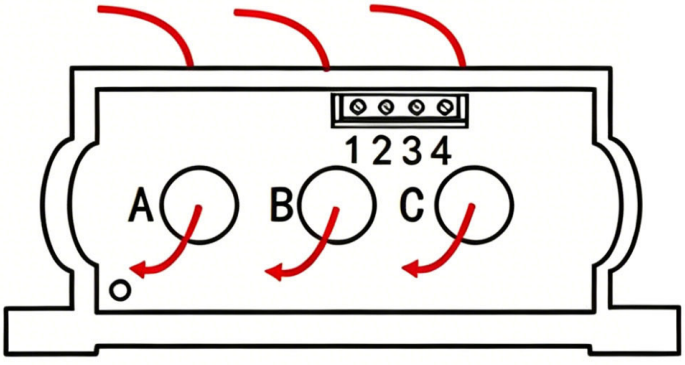
For three-terminal isolated models, the internal isolation layer does not require

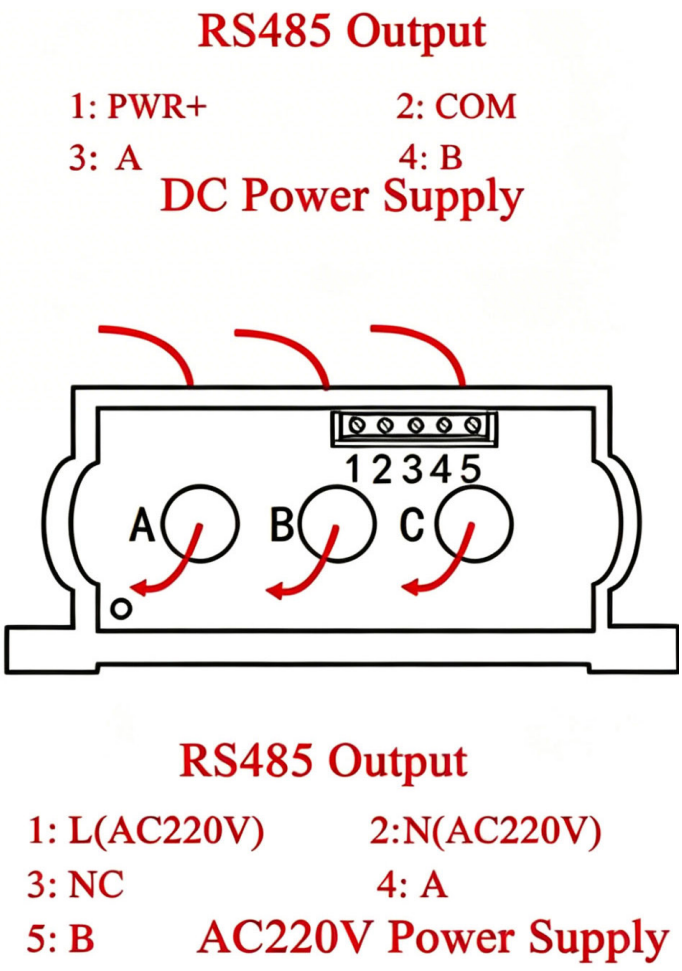
additional grounding. Do not add grounding jumpers without authorization to avoid compromising isolation performance.

6.3, Wiring Diagram Textual Explanation + Wiring Specifications









1. Terminal Labeling and Signal Definitions
Power Terminals: V+ (24 V DC positive), V- (24 V DC negative)
Input Structure: Phase A cable entry, Phase B cable entry, Phase C cable entry (passive cable entry detection; no terminal blocks)
Output Terminals: AO1/AO2/AO3 correspond to the three-phase current isolation signal outputs, respectively, and are equipped with signal positive and signal negative terminals
2. Dedicated Wiring Specifications for Isolated Models
This model features a three-terminal fully isolated design, with complete electrical isolation between the high-voltage input side, the power supply side, and the signal output side; the low-voltage power supply and analog output circuits must not share the neutral or ground wires with the high-voltage circuits; High-voltage and low-voltage cables must be routed on separate levels, maintaining a distance of at least 10 cm, and must not be bundled or routed in parallel.
3. Shielded Cable Handling Specifications
For analog output shielded signal cables, grounding is permitted at a single point on the central control equipment side only; at the transmitter end, the shielding jacket must be insulated and left floating. Grounding at both ends is strictly prohibited to prevent ground loops, which can cause signal drift, value fluctuations, and interference.
4. Comparison of Correct and Incorrect Wiring Practices
Correct Practices: Clearly distinguish between positive and negative terminals of DC power supplies; use independent wiring for each signal line; route three-phase cables through separate holes; route high-voltage and low-voltage cables in separate channels; ground shielded cables at a single point.
Incorrect Practices: Reversed polarity of power supply; multiple signal lines sharing a single output terminal; bundling high-voltage and signal wires together; grounding the shield at both ends; connecting AC high-voltage to low-voltage terminals.

6.4 . Power-On Commissioning Procedure
1. No-Load Test
After all wiring is complete and verified, close the control power supply and connect the equipment to the rated 24V DC power supply; do not energize the three-phase main circuit yet. Conduct a no-load standby test. If the equipment exhibits no abnormal heating, odors, or noises during no-load standby, the power supply circuit wiring is normal.

2. Signal Verification
Gradually apply load current to the three-phase main circuit, increasing the load step by step from low to high according to actual on-site conditions. Use a multimeter to measure the current of the three analog output channels. Under the standard range, the input current should exhibit a linear relationship with the 4–20 mA output signal, with continuous and stable readings and no sudden jumps or gaps.

3. Equipment Status Assessment
The KXT2731 model with a black housing has no external indicator lights; the stability of the output signal serves as the basis for determining operational status. When power supply is normal and the circuit is fault-free, the output signal changes in sync with the load current. If there is no signal output or the signal is stuck at a fixed value, this indicates a wiring error or power supply abnormality.

4. Calibration Method
Compare the actual three-phase current values measured by an on-site ammeter with the data transmitted by the transmitter to the control system. If minor deviations are present, check the tightness of the connections, the shielding grounding method, and the wiring distance. This model is factory-calibrated to high precision; under normal operating conditions, no secondary disassembly and adjustment is required. In case of excessive deviation, contact the manufacturer for fine-tuning of the factory parameters.

6.5 Installation Precautions
1. Overvoltage supply is strictly prohibited. The supply voltage must not exceed the rated range of DC 18V to DC 30V. Do not connect to AC 220V power sources to avoid directly damaging the internal isolation circuits and chips.

2. Avoid high-voltage interference. Do not route three-phase power cables and low-voltage signal cables in the same conduit or channel in close proximity. Keep them away from inverter output cables and high-frequency inverter equipment to minimize electromagnetic coupling interference.

3. Strictly control protection against humid environments. When used in high-humidity, semi-outdoor, or water treatment environments, install dehumidification and dust-proof sealing measures within the enclosure. Do not allow condensation or water ingress on the equipment surface to prevent insulation degradation, which can lead to leakage currents and signal abnormalities.

4. Do not disassemble the housing or modify the internal circuitry without authorization. Do not short-circuit the input, output, or power isolation terminals, as this will compromise the three-terminal isolation structure. Doing so will result in the loss of isolation protection, potentially causing equipment burnout and creating system safety hazards.

5. Do not operate the equipment beyond its rated range for extended periods. The actual operating current at the site must not exceed the equipment's rated input range for prolonged periods, as this will accelerate the aging of internal sensor units and shorten the equipment's service life.

VII. Recommendations for Daily Use & Maintenance
Applicable Product: Qidian KXT2731 Black Housing, Three-Terminal Isolated, Three-Phase AC Current Transmitter
7.1 Key Points for Daily Inspections
1. Signal Stability Monitoring
Check the real-time data of the three current output signals daily via the PLC or central control system to confirm that the values change linearly and smoothly with on-site load variations, with no signal jumps, no stuck readings, and no abnormal fluctuations. If signal jumps or value drift occur, investigate the wiring, shield grounding, and potential sources of on-site interference.

2. Equipment Appearance and Environmental Inspection
Open the control cabinet weekly to visually inspect the black housing of the transmitters for damage, cracks, or deformation, and ensure there is no accumulation of dust or oil residue. Verify that the mounting rail clips are secure and have not shifted, and that the terminal blocks show no signs of oxidation or burn marks. Check that there is no condensation or standing water inside the cabinet, and no signs of corrosive gas or dust intrusion.

3. Temperature and Humidity Monitoring
Continuously monitor the temperature and humidity inside the control cabinet to ensure the temperature remains within the equipment's rated operating range of -10°C to +60°C, and humidity is maintained between 10% RH and 90% RH (no condensation). In high-temperature environments, verify that the cabinet's cooling fans are operating normally to prevent accelerated aging caused by prolonged exposure to high temperatures.

4. Load Condition Inspection
Based on the load current of the on-site three-phase main circuit, verify that the transmitter's input current does not exceed the rated range and that there is no prolonged out-of-range operation. Pay particular attention to short-term surge currents caused by motor starts and inverter switching operations to prevent the transmitter from enduring prolonged overload impacts.

7.2. Regular Maintenance Plan
1. Cleaning Frequency and Methods
In standard industrial environments, perform surface cleaning every 3 months; in high-dust environments, increase the frequency to once a month. When cleaning, use a dry, dust-free soft-bristle brush or low-pressure dry compressed air to blow the surface of the enclosure, the areas around cable entry points, and the gaps between terminal blocks. Do not use liquid cleaners or wet cloths to wipe the equipment body directly, to prevent moisture from entering the internal circuitry.

2. Wiring Tightness Inspection
Conduct a wiring tightness inspection every 6 months. Use an insulated screwdriver of the appropriate size to retighten the screws on the power terminals and output signal terminals to prevent loose connections or poor contact caused by on-site vibrations. Simultaneously, inspect the three-phase power cables inside the cable entry holes for wear or displacement to prevent the cable sheath from coming into contact with the housing.

3. Recommendations for Accuracy Retesting
Conduct an accuracy retest every 12 months. Use a high-precision clamp meter to measure the three-phase main circuit current on-site and compare it with the values transmitted from the transmitter to the central control system. If the error exceeds ±0.5% FS, investigate potential on-site interference or wiring loads, or contact the manufacturer for equipment calibration. This model has undergone high-precision calibration at the factory; under normal operating conditions, no disassembly or adjustment is required.

4. Isolation Performance and Grounding Inspection
Inspect the control cabinet grounding system every 12 months to confirm that the protective grounding resistance meets industrial standards. Simultaneously, verify that the single-ended grounding of signal shielded cables is intact, with no instances of double-ended grounding or damaged shielding, to ensure the equipment's three-terminal isolation performance remains unaffected.

7.3 Long-Term Maintenance Tips
1. Dust and Moisture Protection
Install dust-proof seals, dehumidifiers, or desiccants inside the control cabinet to prevent dust and moisture from entering the equipment. Seal cable entry points to prevent dust and moisture from infiltrating through cable gaps. When equipment is out of service for extended periods, store it in a dry, well-ventilated indoor environment; avoid outdoor storage or stacking in damp conditions.

2. Anti-Interference Optimization Techniques
Regularly inspect the routing of power and signal cables to ensure that three-phase power cables and transmitter output signal cables are laid in separate layers or channels, maintaining a distance of at least 10 cm; do not route them in the same conduit or channel in close proximity; Use shielded twisted-pair cables for signal lines, grounding them at a single point on the central control side only. On the transmitter side, leave the shield floating and insulated to prevent ground loop interference; keep cables away from strong electromagnetic interference sources such as variable frequency drives and high-frequency motors. If necessary, install metal shielding sleeves over the signal cables.

3. Tips for Protecting Equipment in Extreme Environments
In high-temperature environments, install cooling fans or industrial air conditioners inside the control cabinet to prevent the equipment from being exposed to temperatures above 60°C for extended periods. In low-temperature environments, verify the equipment's operating temperature range in advance; if necessary, select equipment with extended temperature and humidity ratings. In high-humidity or corrosive environments, apply a three-proof coating (moisture-proof, mildew-proof, and salt-fog-proof) to the equipment housing, or install a separate protective enclosure to enhance the equipment's environmental adaptability.

4. Tips for Extending Service Life
Avoid prolonged operation beyond the rated capacity; allow for a certain current margin when selecting equipment. Do not disassemble the equipment housing, modify internal circuits, or short-circuit isolation terminals without authorization to prevent damage to the three-terminal isolation structure. Avoid frequent power cycling to reduce damage caused by electrical surges. Before shutting down the equipment, first disconnect the three-phase main circuit load, then turn off the control power to prevent inrush currents caused by powering down under load from affecting the equipment's service life.

VIII. Troubleshooting & Emergency Procedures
Applicable Product: Qidian KXT2731 Black Housing, Three-Channel Isolated, Three-Phase AC Current Transmitter
8.1 List of Common Faults
--- No signal on all three outputs (DC 4–20 mA with no current output; value is 0 or stuck at 0)
--- Signal drift or value fluctuations in one or more channels; unable to stably track changes in load current
--- Signal output locked at a fixed value (constantly at 4 mA, 20 mA, or an intermediate value; does not vary with load)
--- Excessive linear deviation in output signal; error relative to actual on-site current exceeds ±0.5% FS
---Signal distortion due to interference, with frequent fluctuations and severe glitches affecting system control decisions
---No physical indicator lights to signal abnormalities; device unresponsiveness or anomalies detected only through PLC signal acquisition

8.2, Analysis of Fault Causes
1. Wiring errors: Reversed polarity at power terminals, reversed connections between signal output terminals and COM terminals, both ends of the shielding wire grounded simultaneously, or mixing of high-voltage and low-voltage cables

2. Power Supply Abnormalities: DC24V supply voltage exceeds the 18V–30V range; poor power supply contact causing excessive voltage drop; excessive power supply ripple; or reverse polarity protection triggered

3. Signal Overload / Load Mismatch: On-site three-phase current consistently exceeds the rated input range; output-side PLC load impedance exceeds the device's supported range of ≤500Ω

4. Environmental Interference: Close-proximity interference from high-EMF equipment such as inverters or motors; co-routing of high- and low-voltage cables; ground loop interference caused by poor grounding in the control cabinet

5. Installation and Environmental Issues: Wire displacement within cable entry holes causing sensing anomalies; condensation or dust accumulation inside the cabinet leading to reduced circuit insulation; high temperature or high humidity causing internal component aging

6. Equipment Damage: Internal isolation circuits breaking down due to overvoltage; sensing units damaged by overload; terminals burned out due to prolonged poor contact; circuits burned out because reverse polarity protection failed to trigger

8.3 Step-by-Step Troubleshooting
Fault: No signal on all three output channels
Troubleshooting Steps:
Turn off the power and inspect the power terminal connections; verify that the positive and negative terminals of the 24V DC supply are not reversed, and retighten the power terminal screws;
Turn on the power and use a multimeter to measure the voltage at the power terminals; verify that the supply voltage is within the normal range of 18V to 30V, and check for voltage drops or poor contacts in the power circuit;
Check whether the three-phase main circuit is properly energized and confirm the presence of load current to rule out a false “no signal” indication caused by a main circuit power failure;
If all of the above are normal, turn off the power and inspect the equipment housing for burn marks or unusual odors to preliminarily determine if the internal circuitry is damaged.
Remedial Actions: Correct the power connections, replace the 24V DC power supply with a stable one, and resolve any poor contact issues in the power circuit; if the equipment is damaged, replace it with a spare transmitter.
Contingency Plan: Replace with a spare transmitter of the same model to temporarily restore system signal acquisition; investigate the cause of the original equipment failure after a system shutdown.

Fault: Signal drift, value fluctuations
Troubleshooting Steps:
Inspect the shielded signal cable connections to confirm that the shield is grounded at a single point on the central control system side only, and that the shield on the transmitter side is left floating—avoid grounding at both ends;
Inspect the routing of power and signal cables to ensure power cables and signal cables are laid in separate layers and channels, with a minimum spacing of 10 cm, and are not bundled together in the same conduit;
Inspect the control cabinet grounding system to ensure the protective grounding resistance meets standards and there are no instances of poor grounding or loose connections;
Identify and address new sources of interference at the site, such as variable frequency drives and high-frequency equipment, and ensure the transmitter is located away from strong electromagnetic devices.
Remedial Measures: Adjust the grounding method of the shielded cable, optimize the spacing between power and signal cables, and reinforce the control cabinet grounding; if necessary, install metal shielding sleeves on the signal cables.
Contingency Plan: Temporarily reroute the signal cables away from interference sources; if rerouting is not possible, increase the signal filtering parameters on the PLC side to mitigate the impact of signal fluctuations.

Fault: Signal stuck at a fixed value / Excessive linear deviation
Troubleshooting Steps:
Check the load impedance on the output side; verify that the PLC analog module’s input impedance is ≤500Ω and does not exceed the device’s supported range;
Use a high-precision clamp meter to measure the three-phase main circuit current and compare it with the transmitter’s output value to confirm whether the deviation exceeds ±0.5% FS;
Check whether the three-phase conductors are correctly routed through the cable entry holes, ensuring no conductor misalignment or multiple conductors passing through a single hole;
Check whether the device has been operating outside its range for an extended period; confirm that the input current does not exceed the rated range of 0–20 A AC.
Remedial Actions: Replace with a compatible PLC analog module, correct the wiring method, and adjust the load current to within the rated range; contact the manufacturer to calibrate devices with excessive deviation.
Contingency Plan: Temporarily use a single-channel current transmitter to replace the faulty channel to ensure current monitoring of critical circuits; replace or calibrate the original equipment after a shutdown.

Fault: Interference distortion, severe signal glitches
Troubleshooting Steps:
Check whether shielded twisted-pair cable is used for signal lines; ensure that standard unshielded cables are not used directly;
Check whether high-frequency contactors, variable frequency drives, or similar equipment are operating in close proximity within the cabinet; ensure the transmitter is installed away from sources of interference;
Check whether the power supply circuit is shared with other high-power equipment; verify if excessive power supply ripple is causing signal interference.
Remedial Actions: Replace with shielded twisted-pair cable, install signal ferrites, optimize the power supply circuit to avoid sharing power with high-power equipment; install a power filter if necessary.
Contingency Plan: Install high-frequency ferrites at both ends of the signal cable to temporarily suppress interference signals; thoroughly optimize the cabling and grounding system after the system is shut down.

8.4 After-Sales Repair Guidelines
1. Criteria for Determining a Malfunction
Under normal power supply and correct wiring conditions, the device has no output or signal deviation exceeds ±0.5% FS, and the issue cannot be resolved through basic troubleshooting;
The device housing shows signs of burning, emits an unusual odor, or has cracks, or the terminals are severely oxidized or burned;
Isolation performance has failed, causing high-voltage current to enter the low-voltage circuit, resulting in abnormal signals on the PLC side or device damage.

2. Repair Process
Record the model (KXT2731), serial number, installation date, fault symptoms, and on-site operating conditions of the faulty device;
Take photos or screenshots of the device’s exterior, terminal blocks, control cabinet installation environment, and any abnormal signals on the PLC side;
Contact the manufacturer’s technical support, submit the fault details and on-site documentation, and cooperate with technicians to complete remote troubleshooting;
After the fault is confirmed via remote troubleshooting, follow the manufacturer’s instructions to arrange for device repair or replacement.

3. Warranty Coverage
The equipment is covered by a standard warranty starting from the date of manufacture. During the warranty period, faults not caused by human error are eligible for free repair or replacement;
Damage caused by human error (such as overvoltage, unauthorized disassembly, or burnout due to wiring errors), damage caused by force majeure (such as lightning strikes or fire), and equipment outside the warranty period are not covered by the free warranty but may be eligible for paid repair services.

4. Contact Information and Follow-up Services
The manufacturer provides a technical support hotline, offering services such as remote troubleshooting, installation and commissioning consultation, and product selection advice during business hours;
After the device is returned for repair, the manufacturer will complete inspection and repair within 3–5 business days and issue an inspection report;
Long-term partners are eligible for value-added services such as regular on-site inspections, equipment calibration, and bulk maintenance.