KXT43U 3-Phase AC Voltage Transducer

I. Product Definition

The KXT43U series is an industrial-grade three-phase AC voltage signal isolation transmitter module launched by Anhui Qidian Automation Technology Co., Ltd. It features a blue plastic housing and a DIN-rail mounting design. Its core functions can be summarized as follows:

1. High-precision acquisition of three-phase voltage signals: Supports three-phase three-wire / three-phase four-wire AC voltage measurement. It can directly interface with multi-range industrial field voltage signals such as AC 0–150 V, 0–380 V, and 0–500 V (refer to the 3×AC150V input specification of model KXT13). Equipped with three independent sampling channels, it can simultaneously monitor the voltages of phases A, B, and C, as well as the neutral line potential.
2. Electrical Isolation and Safety Protection: Utilizes three-terminal isolation technology for input, output, and power supply, with an isolation withstand voltage of ≥2.5 kV AC. This completely blocks the impact of high-voltage intrusion, ground loop interference, and common-mode noise on downstream control systems, ensuring the safe operation of low-voltage equipment such as PLCs and DCS systems.
3. Standard Industrial Signal Conversion: The acquired AC voltage signals are linearly converted into three standard DC analog signals. The standard output specification is DC 4–20 mA (0–5 V or 0–10 V available upon request), meeting the signal interface requirements of industrial automation systems.
4. Wide Temperature Range and Interference Resistance: Featuring an industrial-grade design, it operates stably in a wide temperature range of -25°C to +70°C. CE-certified, it is capable of withstanding strong electromagnetic interference and significant voltage fluctuations in industrial environments (such as those involving variable frequency drives, arc welders, and motor control applications).
5. Plug-and-Play and Easy Installation: Features 35mm standard DIN rail mounting. Input/output terminals use a screw-type wire clamping design for quick wiring. Built-in surge and overvoltage protection circuits eliminate the need for additional signal conditioning modules, reducing system complexity.

II. Operating Principle

The operating process of the KXT43U series can be broken down into five core stages, achieving full electrical isolation between the “high-voltage side” and the “low-voltage side” as well as linear signal conversion throughout the process:

1. Signal Input and Preprocessing

The three-phase AC voltage from the industrial field (e.g., AC 380V) is connected to the transmitter’s input terminals. It first passes through a high-precision voltage divider network (or voltage transformer) to step down the voltage, converting the high-voltage signal into a low-voltage sampling signal in the millivolt range. Simultaneously, a built-in filter circuit removes spikes and noise interference from the power grid, ensuring the purity of the sampling signal.

2. Electrical Isolation Stage (Three-Port Isolation Core)

Magnetic isolation (transformer coupling) or opto-isolation technology is employed to completely decouple the circuits on the input, output, and power supply sides. There is no direct electrical connection between these three sides; energy and data are transmitted solely via electromagnetic or optical signals, physically blocking high-voltage intrusion and interference propagation.

3. Signal Processing and Linear Calibration

The isolated low-voltage sampling signal is fed into the signal processing unit. Through a root mean square (RMS) conversion circuit, the voltage values of non-sinusoidal waves (such as distorted waveforms output by inverters) are accurately calculated as RMS values. The signal then undergoes linear amplification and temperature drift correction to ensure signal linearity and accuracy.

4. Standard Signal Output

The processed signal is converted into a three-wire linear proportional standard DC signal (e.g., AC 0–150 V corresponds to DC 4–20 mA). The output signal has an accuracy error of ≤±0.2% and a temperature drift of ≤50 ppm/°C, meeting the high-precision requirements of industrial control.

5. Power Supply and Status Feedback

The transmitter is powered by a standard 24 V DC industrial power supply and features an integrated power management circuit to ensure stable operation within a supply voltage range of 18 to 30 V. Some models support output status self-diagnosis; in the event of an anomaly, the fault is indicated by an abnormal change in the output signal.

III. Core Value

1. Overview of Core Value

The core value of the KXT43U series lies in addressing the four key challenges—safety, accuracy, noise immunity, and compatibility—encountered during the “acquisition, isolation, and transmission of three-phase voltage signals” in industrial environments, thereby providing stable and reliable voltage monitoring signals for automation control systems.

2. Pain Points and Solutions

Q: When high-voltage signals from industrial sites are directly connected to low-voltage control systems such as PLCs and DCSs, there is a risk of high-voltage intrusion, which can easily burn out downstream equipment and cause significant losses. How can this be resolved?

A: The KXT43U series three-phase AC voltage transmitters employ three-terminal isolation technology for input, output, and power supply, with an isolation withstand voltage of over 2.5 kV AC. By achieving complete physical circuit isolation, they thoroughly block the transmission path of high-voltage signals to the control system, effectively preventing damage to downstream equipment caused by high-voltage intrusion. This significantly reduces equipment failure rates and downtime maintenance costs, providing a robust safety barrier for control systems.

Q: Industrial field environments have complex power grid conditions, with significant electromagnetic interference and ground potential differences, which can lead to unstable voltage signal transmission and large measurement errors, affecting the control system’s decision-making and actions. How can this be resolved?

A: The KXT43U series features a built-in dedicated filtering circuit combined with a three-terminal isolation design. This effectively suppresses common-mode and differential-mode interference in the power grid, eliminates the impact of ground loop currents on signals, and ensures stable voltage signal transmission in complex electromagnetic environments. Measurement errors are controlled within ±0.2%, preventing system malfunctions caused by signal fluctuations and enhancing the stability of production processes.

Q: Equipment such as inverters and welding machines generates non-sinusoidal voltages during operation. Conventional transmitters cannot accurately measure the voltage values of such distorted waveforms, leading to large measurement errors and control logic failures. How can this be resolved?

A: The KXT43U series employs true RMS conversion technology, enabling precise calculation of the true root-mean-square (RMS) values of non-sinusoidal and distorted waveforms. Even when faced with non-standard waveform voltages generated by inverters or motor loads, it achieves high-precision measurement, preventing control logic errors caused by measurement distortion and ensuring precise control of equipment operation.

Q: Traditional voltage signals have limited transmission distances and are prone to signal attenuation during long-distance transmission, making them unsuitable for the requirements of large-scale distributed control systems in industrial environments. How can this be resolved?

A: The KXT43U series outputs an industrial-standard 4–20 mA current signal. Such signals inherently possess strong anti-interference capabilities and are not easily affected by line resistance or electromagnetic interference during long-distance transmission. With a transmission distance of over 1,000 meters, they can easily accommodate long-distance signal transmission scenarios in large factories and distributed production lines, ensuring stable signal transmission.

Q: Voltage specifications vary significantly across different industrial sites, requiring custom signal conditioning modules for different devices. This leads to a large variety of spare parts and high procurement and management costs. How can this be resolved?

A: The KXT43U series supports multi-range input, covering mainstream industrial voltage specifications such as AC 0–150 V, 0–380 V, and 0–500 V. It also allows for customization of output signal types (e.g., 0–5 V, 0–10 V) based on requirements. A single device can adapt to multiple application scenarios, significantly reducing the variety of spare parts, lowering procurement and inventory management costs, and improving

project adaptation efficiency.

Q: Industrial environments are harsh and subject to wide temperature fluctuations. Conventional transmitters are prone to reduced measurement accuracy due to temperature drift, which affects long-term operational stability. How can this issue be resolved?

A: The KXT43U series features an industrial-grade wide-temperature design with an operating range of -25°C to +70°C. It also incorporates a high-precision temperature drift correction circuit that minimizes temperature drift, ensuring stable measurement accuracy in both high and low-temperature environments. This makes it suitable for various harsh operating conditions, such as metallurgy, chemical processing, and outdoor equipment, thereby ensuring long-term operational reliability.

Q: The on-site installation and commissioning process is cumbersome, with complex wiring that is prone to errors, affecting project construction progress. How can this be resolved?

A: The KXT43U series features a 35mm standard DIN rail mounting design, compatible with common industrial control cabinet installation standards. It also utilizes screw-type terminals for clear and intuitive wiring, supporting both three-phase three-wire and three-phase four-wire configurations. This facilitates easy installation and simple commissioning, significantly shortening on-site installation and commissioning cycles and improving construction efficiency.

Additional Note: Relationship Between the KXT43U and Reference Model KXT13

The model in the image you uploaded is the KXT13 three-phase four-wire voltage transmitter. The KXT43U series is an upgraded/expanded model within the same series. Both share the same core technology, featuring a blue housing and a three-terminal isolation design. The main differences are as follows:

Extended Measurement Range: The KXT43U supports a wider input voltage range (e.g., AC 0–500 V);

Channel Adaptability: Certain models support three-phase, three-wire wiring, making them suitable for a wider range of industrial applications;

Improved Accuracy: The accuracy grade of certain models has been upgraded to ±0.1%, meeting the demands of more stringent metering scenarios.

IV: Key Product Specifications

4.1 Basic Electrical Specifications

Product Model: KXT43U Series Three-Phase AC Voltage Transmitter

Measurement Object: Three-phase AC voltage (compatible with both three-phase three-wire and three-phase four-wire systems)

Input Voltage Range (Standard): 0–150 VAC / 0–300 VAC / 0–500 VAC (custom extended ranges available)

Input Signal Type:AC Voltage (includes sine waves / non-sinusoidal distorted waveforms, suitable for inverters and motor load applications)

Output Signal Type (Standard):DC 4–20 mA (single-channel / three-channel independent output, one output per phase)

Optional Output Specifications:DC 0–5 V / DC 0–10 V / RS485 Modbus-RTU (Custom Version)

Measurement Accuracy: ±0.2% FS (Standard Version); ±0.1% FS (High-Precision Custom Version)

Linearity Error: ≤±0.1% FS

Repeatability Error: ≤±0.05% FS

Response Time:≤100 ms (Standard Version); ≤20 ms (Fast-Response Custom Version)

Load Capacity (Current Output): ≤500Ω (DC 4-20mA Output)

Ripple and Noise: ≤10mVpp

Frequency Response:20Hz–1kHz (Suitable for mains frequency and industrial variable-frequency applications)

Input Impedance:≥1MΩ (To avoid loading effects on the circuit under test)

4.2 Isolation Performance Parameters

Isolation Architecture: Three-way isolation (complete electrical isolation between input, output, and power supply)

Isolation Withstand Voltage:≥2500 V AC (1 minute, between input–output / input–power supply / output–power supply)

Isolation Method:Dual protection via magnetic isolation + optical isolation (Stronger common-mode interference immunity)

Common-Mode Rejection Ratio (CMRR): ≥100 dB (50 Hz/60 Hz)

Differential-Mode Rejection Ratio (DMRR):≥80 dB

Insulation Resistance: ≥100 MΩ (500 V DC)

Surge Immunity:Complies with IEC 61000-4-5 standard, ±2 kV surge protection

4.3 Power Supply & Power Consumption Parameters

Supply Voltage (Standard):DC 24V (Industrial standard power supply, compatible with PLCs and control cabinet power distribution systems)

Supply Voltage Range:DC 18V–30V (Wide-range compatibility, accommodates fluctuations in on-site power supply)

Reverse Polarity Protection:Built-in reverse polarity protection circuit to prevent equipment damage caused by reversed polarity

Power Consumption at Full Load:≤1.5W (single-channel output); ≤2.5W (three channels outputting at full load simultaneously)

Power Distribution Output (Optional):None (pure signal transmission type); some custom models feature a DC 24V auxiliary power output (100mA max)

Power Supply Ripple Suppression: ≥60dB (suppresses ripple interference on the power supply side)

4.4 Environmental Adaptation Parameters

Operating Temperature:-25°C to +70°C (industrial-grade wide-temperature design, suitable for metallurgy, chemical, and outdoor applications)

Storage Temperature: -40°C to +85°C

Operating Humidity: 10%–90% RH (non-condensing)

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

Protection Rating: IP30 (enclosure protection, suitable for installation inside control cabinets)

Explosion-Proof Rating: Non-explosion-proof version; Intrinsically safe versions compatible with safety barrier models: Zener-type / Isolated intrinsically safe barriers (custom)

Vibration Resistance:Complies with IEC 60068-2-6 standard, 10–150 Hz, 1g vibration test

Shock Resistance:Complies with IEC 60068-2-27 standard, 15g shock test

Electromagnetic Compatibility:Complies with CE/EMC standards; resistant to electrostatic discharge, radio frequency radiation, and electrical fast transient/burst interference

4.5. Physical Parameters

1. Basic Physical Specifications

Housing Material:Flame-retardant ABS engineering plastic (blue industrial housing, resistant to aging and corrosion)

Mounting Method:35mm standard DIN rail mounting (compatible with universal industrial control cabinet rails)

Dimensions: (Refer to the KXT13 model in the same series) Length × Width × Height: 75mm × 45mm × 100mm (±2mm tolerance)

Weight: Approx. 150g (excluding terminal accessories)

Terminal Blocks:Screw-type terminal blocks, compatible with wire gauges 0.5–1.5mm²

V. Application-Specific Selection Guide

5.1 Key Selection Criteria

When selecting the KXT43U series, prioritize the following criteria to quickly identify the appropriate model and avoid selection errors:

Signal Type Matching

Input: Three-phase AC voltage AC 0–150 V / 380 V / 500 V

Output: Standard 4–20 mA (most common), 0–5 V, 0–10 V

Prioritize 4–20 mA: Strong anti-interference capability and long transmission distance, suitable for industrial environments

Channel Configuration

The KXT43U is designed exclusively for three-phase applications and features a 3-input, 3-output configuration:

Input: A, B, C three-phase voltages

Output: Three corresponding independent analog signals

Does not support 1-in-1-out or 1-in-2-out configurations; this is a dedicated three-phase transmitter

For single-phase voltage monitoring, please select the Qidian KXT11U/KXT21U series

Power Supply

Standard power supply: DC 24V (wide voltage range: 18–30V)

No AC 220V power supply version available; all models use DC power

A switching power supply is required if no 24V power source is available on-site

Isolation Rating Requirements

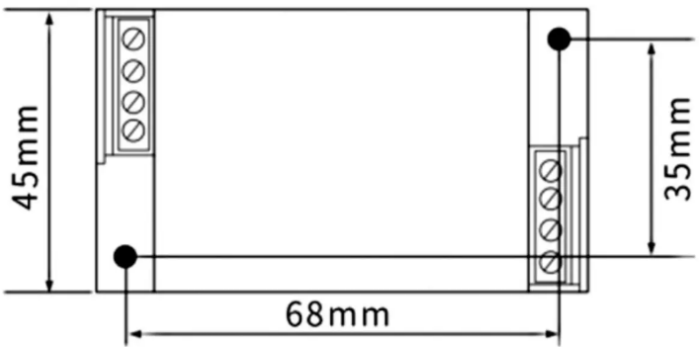
Standard Model: Three-terminal isolation, withstand voltage ≥2.5kV AC

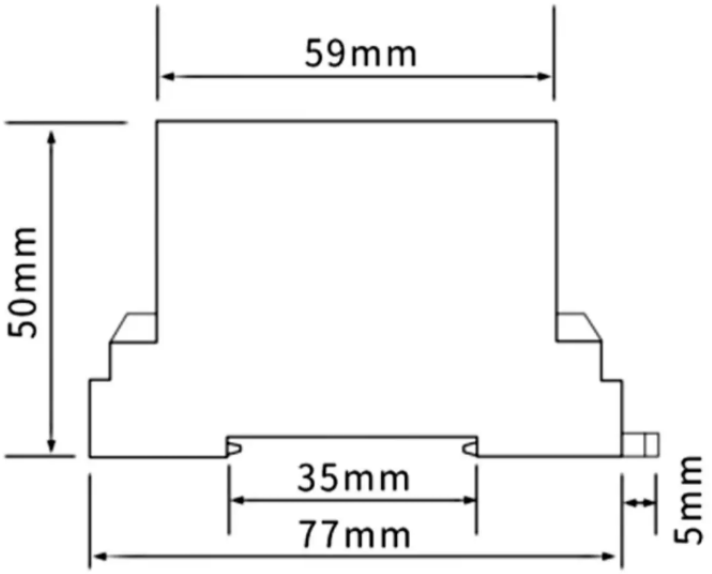
This model must be selected for high-interference environments (near inverters or medium-frequency furnaces); non-isolated or two-terminal

isolated models cannot be used as substitutes
Explosion-Proof Requirements
Standard Model: Non-explosion-proof; suitable for general industrial control environments
Explosion-hazardous areas (e.g., chemical, oil and gas industries): Select the intrinsically safe custom version and use it in conjunction with an isolated safety barrier
Installation Environment
Indoor control cabinet installation: The standard blue enclosure model is sufficient
Humid, dusty, or corrosive environments: We recommend installing a protective enclosure; the product itself has an IP30 rating and is suitable for cabinet installation
5.2. Recommended Models by Industry Application
1. Power Industry (Substations, Distribution Rooms, Photovoltaic, Wind Power)
Recommended Model: KXT43U Standard Three-Terminal Isolated Version
Range: AC 0–450 V / 0–500 V
Output: 4–20 mA
Applications: Busbar voltage monitoring, low-voltage distribution monitoring, grid-connected voltage acquisition, DCS system integration
Advantages: Three-terminal isolation resists ground loop interference; high accuracy; long-term stability
2. Chemical Industry (Chemical Parks, Reactors, Compressor Systems)
Standard Conditions: KXT43U Standard Model
Explosion-Proof Areas: KXT43U Intrinsically Safe Custom Model + Intrinsically Safe Barrier
Range: AC 0–380 V / 0–450 V
Applications: Motor voltage monitoring, voltage acquisition for variable frequency drives, power distribution monitoring in hazardous chemical workshops
Advantages: High isolation voltage, resistance to electromagnetic interference, explosion-proof models comply with safety standards
3. Metallurgy Industry (Steel rolling, electric furnaces, mines, lifting equipment)
Recommended Model: KXT43U Enhanced Anti-Interference Model
Range: AC 0–500 V
Output: 4–20 mA
Applications: High-power motors, electric arc furnaces, overhead crane power supply voltage monitoring
Advantages: Three-terminal isolation completely blocks strong interference; suitable for environments with significant voltage fluctuations and severe harmonics
4. Pharmaceutical / Food Industry (Cleanrooms, Sterile Production Lines)
Recommended Model: KXT43U Standard Version
Range: AC 0–380 V
Applications: Air conditioning units, water pumps, fans, automated production line voltage monitoring
Advantages: Compact size, DIN-rail mounting, and neat wiring, meeting GMP workshop standards
5. Smart Manufacturing / Equipment Manufacturing (Machine Tools, Robots, Automated Production Lines)
Recommended Model: KXT43U Standard Version
Range: AC 0–380 V
Output: 4–20 mA for PLC integration
Applications: Monitoring of three-phase power supply status, energy consumption analysis, and safety protection control
Advantages: Fast response, high accuracy, plug-and-play, compatible with various PLC systems
6. Municipal Engineering (Water Supply, Heating, Wastewater Treatment)
Recommended Model: KXT43U Standard Version
Range: AC 0–380V/450V
Applications: Remote voltage monitoring for pump stations, blowers, and distribution cabinets
Advantages: Wide operating temperature range, suitable for harsh environments such as underground equipment rooms and outdoor cabinets

5.3 Common Selection Pitfalls and How to Avoid Them
Pitfall 1: Ignoring three-terminal isolation and selecting standard non-isolated or two-terminal isolated products
Issue: Severe ground loop interference and high-voltage crosstalk at the site, leading to PLC damage and signal fluctuations
Correct Approach: Three-phase industrial voltage monitoring must use three-terminal isolated models; the KXT43U series is specifically designed for such scenarios
Misconception 2: Selecting the wrong range, leading to inaccurate measurements or outright burnout
Problem: Selecting the AC 0–250 V range for a 380 V AC site, resulting in long-term damage due to over-range operation
Correct Approach:
Standard 380 V system → Select AC 0–450 V or 0–500 V
110V/220V systems → Select AC 0–150V or 0–300V
Allow for a margin of at least 20%
Misconception 3: Ignoring output load capacity, leading to signal distortion
Problem: 4–20mA output cables are too long or the load is too heavy, resulting in a low signal
Correct Approach:
Total load for 4–20mA output ≤ 500Ω
Prioritize shielded cables for long-distance transmission to reduce interference
Misconception 4: Directly selecting general-purpose models for explosion-proof environments
Issue: Using non-explosion-proof transmitters in flammable and explosive environments poses safety hazards
Correct Approach:
Zone 0/1/2 must use the intrinsically safe, custom-designed KXT43U
Use compliant isolated safety barriers in conjunction
Misconception 5: Using single-phase transmitters to replace three-phase products
Issue: Purchasing 3 single-phase transmitters to replace 1 KXT43U results in high costs, messy wiring, and excessive space consumption
Correct Approach: For three-phase systems, directly use the KXT43U integrated three-phase transmitter

5.4 Customization Recommendations
For special operating conditions, the KXT43U series offers customized solutions:
Customized Measurement Ranges
Non-standard voltage inputs such as 0–100 V AC, 0–600 V AC, and 0–690 V AC
Suitable for special-purpose equipment, export equipment, and high-voltage power distribution systems
Customized Output Signals
0–5 V, 0–10 V, 1–5 V, RS485 Modbus-RTU
Suitable for interfacing with host computers, touchscreens, and IoT data acquisition modules
High-precision customization
Standard accuracy: ±0.2% FS
Upgradable to ±0.1% FS for metering, energy consumption monitoring, and high-precision test platforms
Explosion-proof and intrinsically safe customization
Intrinsically safe type: Ex ia IIC T4–T6 Ga
For use with safety barriers; suitable for Zone 1 and Zone 2 explosion-hazard areas in the oil, gas, and chemical industries
Structure and Appearance Customization
Custom Terminal Configuration
Special Dimensions and Label Printing
Multi-Channel Integration Customization (Combined Voltage + Current Transmitter)
Wide Temperature Range / High Protection Customization
Extended operating temperature range to -40°C to +85°C
Enhanced moisture, salt fog, and corrosion resistance; suitable for offshore platforms and coastal regions





VI: Installation and Commissioning Guidelines

6.1 Pre-installation Preparation

1. Component Verification

Verify product model: KXT43U series; confirm measurement range, output signal, and power supply specifications

Inspect appearance: Ensure the blue housing is undamaged, terminals are not deformed, indicator lights are intact, and labels are clear

Required accessories: 35mm DIN rail, screw-type terminal blocks, shielded cable, power cord, cable ties

Document Verification: Ensure product label parameters match the order to prevent incorrect installation or misuse

2. Environmental Inspection

Installation Location: Inside a control cabinet that is dry, dust-free, and free of corrosive gases

Ambient Temperature: Ensure it is within the range of -25°C to +70°C

Keep Away from Interference Sources: Keep away from equipment that generates strong electromagnetic interference, such as variable frequency drives, contactors, transformers, and power cables

Space Allocation: Allow at least 20 mm of clearance around the transmitter for heat dissipation and wiring

3. Tool List

Phillips screwdriver, wire strippers, multimeter (voltage/current range)

Wire crimping pliers, electrical tape, shielded cable grounding terminal

Handheld signal generator/calibrator (for commissioning)

4. Safety Precautions

Never connect or disconnect wires while the system is energized; always disconnect the on-site high-voltage power supply and the main power source first.

Verify that the input is AC voltage; do not connect DC high-voltage or high-current signals.

Although three-terminal isolated products feature isolation protection, follow standard operating procedures to prevent electric shock.

Installation in explosion-proof zones must comply with explosion-proof safety regulations.

6.2 Standard Installation Procedure

1. Mounting on the Rail

Align the latches on the KXT43U blue-cased transmitter with the 35mm standard DIN rail.

Press down and push gently; the unit is securely mounted when you hear a “click.”

When installing multiple units side by side, maintain a spacing of ≥10mm to facilitate heat dissipation.

2. Wiring Specifications (Strictly Separate Power / Input / Output)

Power Terminals

Connect to a 24 VDC power supply; ensure positive and negative terminals are not reversed

Use 0.5–1.5 mm² copper-core wire

Install a fuse on the power side to prevent equipment damage from short circuits

Three-Phase Voltage Input Terminals

Connect to the A, B, and C phases of the AC voltage

For a three-phase four-wire system, connect the N neutral wire

It is recommended to use color-coded input cables to prevent incorrect phase sequencing

Output Signal Terminals

Three independent outputs: A+, B+, C+, and common terminal (COM)

The 4–20 mA output is a current-loop signal; ensure positive and negative terminals are correctly connected when interfacing with a PLC or data acquisition module

Preferably use two-conductor shielded cables for output wiring

3. Grounding Requirements

The transmitter housing does not require grounding; the three-terminal isolation structure does not rely on grounding to enhance immunity to interference

Shield grounding at a single point: It is recommended to ground the shield reliably at the PLC or data acquisition cabinet end

Do not share a common ground for input, output, and power to avoid ground loop interference

Grounding resistance requirement: ≤4Ω

6.3. Wiring Diagram Instructions (Standard Text-Based Diagram)

1. Standard Wiring Configuration

Power Supply Section

DC24V+ → Power Supply Positive Terminal

DC24V- → Common (COM) / Power Supply Negative

Three-Phase Input Section

Phase A Voltage → Phase A Input Terminal

Phase B Voltage → Phase B Input Terminal

Phase C Voltage → Phase C Input Terminal

Neutral (N) Wire (if required) → N Terminal

Output Section

Phase A Output → Module A Output + → Device AI+

Phase B Output → Module B Output + → Device AI+

Phase C Output → Module C Output + → Device AI+

All Output Negatives → Common COM → Device AI-

2. Shielding Wire Handling

Ground the shielding mesh on the control cabinet side only; leave it floating on the field side.

Do not ground the shielding layer at both ends to avoid ground loop interference.

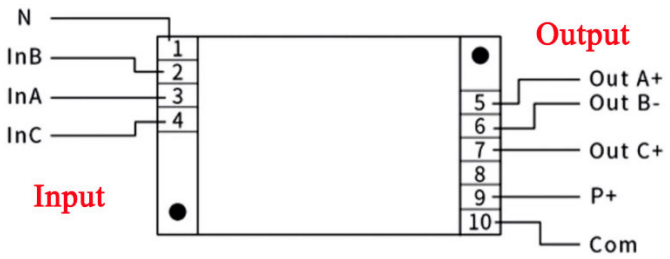
3. Common Wiring: Correct vs. Incorrect

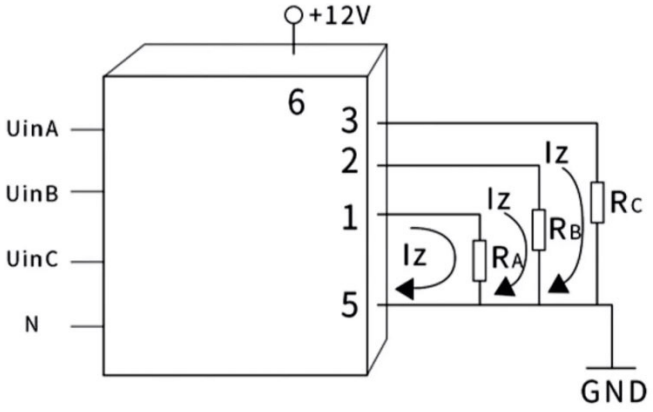
Correct: Power, input, and output lines are routed separately; shield is grounded at one end

Incorrect: High-voltage input and output signals are routed in the same conduit, causing interference and safety hazards

Correct: 24V polarity is correct; indicator lights illuminate normally

Incorrect: Power is connected in reverse, which may trigger internal protection or cause equipment damage





6.4 Power-On Commissioning Procedure
1. No-Load Test
Connect the DC 24V power supply
The green PWR indicator remains lit, indicating normal power supply
No alarm lights are on, no overheating, and no unusual odors indicate normal no-load operation
2. Signal Verification
Apply a standard three-phase AC voltage signal
Measure the output current with a multimeter
0V input → 4mA output
Rated voltage input → 20mA output
The response should be linear at intermediate points, with no noticeable jumps
3. Indicator Status Interpretation
PWR (Green): Steady on = Power supply normal; Off = Power failure or no power connected
ALM (Red): Off = Normal; Steady on = Overrange / Input abnormality / Internal fault
4. Accuracy Calibration Method
Zero Calibration: Input 0V, adjust the zero potentiometer until the output = 4.00mA
Full-Scale Calibration: Apply rated voltage; adjust the full-scale potentiometer until the output equals 20.00 mA
Replace the cover after calibration to prevent accidental contact
For high-demand applications, on-site verification is recommended once a year

6.5 Installation Precautions (Must Read)
1. Never exceed the rated supply voltage
Rated at 24 V DC, with an allowable range of 18–30 V. Never connect to 220 V AC or higher voltages, as this will cause immediate burnout.
2. Do not apply input voltages beyond the rated range
Do not connect to AC voltages exceeding those specified on the label to prevent breakdown of the internal sampling circuit.
3. Do not run high-voltage and low-voltage cables in the same conduit
Power cables and inverter cables must be routed separately from the transmitter's input and output cables to prevent interference and breakdown.
4. Do not install directly in damp, condensing, or spray environments
The product has an IP30 protection rating and is only suitable for installation inside enclosures; damp environments require additional moisture protection and heating devices.
5. Do not use standard models in explosion-proof zones
In hazardous environments, the intrinsically safe custom version + safety barrier must be used; standard models are prohibited in explosion-proof applications.
6. Never connect or disconnect terminals while the power is on.
All wiring and disconnection operations must be performed with the power disconnected to prevent surge damage to the module and downstream equipment.
7. Never allow the output to remain short-circuited for extended periods.
The 4–20 mA output can withstand short-term short circuits, but prolonged short-circuiting will affect service life and accuracy.

7: Recommendations for Daily Use & Maintenance
7.1 Key Points for Daily Inspections
1. Checking Indicator Light Status
Check the PWR power indicator light: A steady green light indicates normal power supply; flashing or no light indicates a power supply abnormality, loose wiring, or a power failure.
Check the ALM alarm indicator light: It should be off under normal conditions; a steady light indicates an out-of-range input, signal abnormality, internal module failure, or unstable power supply.
Inspection Frequency: Inspect at least once per shift or per day to ensure early detection of abnormalities.
2. Signal Stability Monitoring
View the three-phase voltage readings via the PLC, DCS, or host computer to check for abnormalities such as sudden changes, drift, zeroing, or full-scale readings.
Pay close attention to signal fluctuations during the start/stop cycles of variable frequency drives, overhead cranes, and high-power motors; excessive fluctuations indicate interference or wiring issues.
Record the signal range under typical operating conditions and establish baseline values for future comparison.
3. Temperature and Humidity Monitoring
Check the temperature inside the transmitter cabinet to ensure it remains within the operating range of **-25°C to +70°C**. Avoid placing the cabinet near heat sources such as heaters or transformers.
Check the cabinet for condensation, standing water, or signs of moisture. Excessive humidity can lead to reduced insulation, measurement drift, or even short circuits.
Extra attention should be paid to temperature and humidity fluctuations in outdoor cabinets, underground equipment rooms, and high-humidity environments.

7.2. Regular Maintenance Schedule
1. Cleaning Frequency and Methods
Standard environments: Clean surface dust every 6 months using a dry, soft-bristled brush or compressed air. Do not wipe with a damp cloth.
Environments with high levels of dust, lint, or metal dust (e.g., metallurgy, textiles, building materials): Clean every 3 months to prevent dust accumulation from reducing insulation.
Power must be disconnected before cleaning to prevent short circuits or electric shock.
2. Wiring Tightness Inspection
Inspect and tighten the screws on the power supply, input, and output terminals every 6 months to prevent loosening or loose connections caused by vibration.
Key inspection points: Three-phase voltage input terminals, 24V power supply terminals, and output signal common terminal (COM).
If the site experiences significant vibration (e.g., near cranes, pumps, or compressors), it is recommended to inspect these points every 3 months.
3. Recommendations for Accuracy Retesting and Calibration
General industrial control applications: Calibrate the zero point and full-scale range once a year to ensure measurement accuracy meets control requirements.
Metrology, energy consumption assessment, and high-precision monitoring applications: Perform a full-scale calibration every 6 months using a standard voltage source and a multimeter.
Calibration items: Zero point (4 mA), full-scale point (20 mA), and mid-range linearity.
Maintain detailed records after calibration and establish an equipment maintenance log.

7.3 Tips for Long-Term Maintenance
1. Dust and Moisture Protection Measures
Keep the control cabinet sealed and install dust filters to minimize the ingress of dust, oil, and corrosive gases.
For high-humidity, coastal, or underground equipment rooms: Install dehumidifiers, heating plates, and desiccants to prevent condensation from corroding circuit boards and terminals.
When the equipment is idle for extended periods, disconnect the power supply and store it in a sealed environment to prevent moisture-induced oxidation.
2. Long-Term Interference Mitigation
Use shielded cables for the entire signal line; ensure the shield is reliably grounded at one end only; do not ground both ends to prevent ground loops.
Route high-voltage cables (power lines, inverter cables) separately from transmitter signal lines, using separate cable trays, and avoid bundling them in parallel over long distances.
Install surge protectors or filtered power supplies on the power side to reduce the impact of grid spikes and lightning surges.
3. Protection Against Extreme Environments
High-Temperature Environments: Ensure adequate ventilation inside the cabinet; do not stack objects above the transmitters to allow for heat dissipation.
Low-Temperature Environments: Ensure the cabinet interior temperature remains no lower than -25°C; install low-temperature heaters if necessary.
High-Vibration Environments: Install mounting clips at both ends of the mounting rails and secure cables with ties to reduce terminal fatigue and loosening.
Corrosive Environments (Chemical, Acid/Alkali Workshops): Apply anti-corrosion treatment to terminals, reinforce cabinet sealing, and shorten maintenance intervals.

VIII: Troubleshooting & Emergency Response

8.1 List of Common Faults

No output signal / Output remains at zero

Output signal is fixed at 4 mA and does not change

Output signal is fixed at 20 mA and does not change

Signal drift, slow offset, or inaccurate measurement

Signal jumps, jitter, high noise, or distortion

Three-phase output inconsistencies or excessive deviation

Abnormal internal heating of the transmitter after power-up

8.2. Symptoms — Cause Analysis — Troubleshooting

1. Problem: No output signal (output is 0 mA or shows no change)

Possible Causes

Power supply not connected; DC 24 V wiring reversed

Supply voltage below 18 V; unit cannot operate normally

Output circuit open; COM terminal not securely connected

Internal power supply circuit of the transmitter damaged

Troubleshooting

Turn off the power, check the polarity of the DC24V wiring, and re-crimp the connections securely

Use a multimeter to measure the supply voltage and ensure it is within the 18–30V range

Check the output circuit for open circuits and re-tighten the COM terminal

If there is still no output after replacing the power supply with a qualified one, determine that the transmitter is damaged and replace it

2. Fault: Output signal is fixed at 4mA and does not change

Possible Causes

Three-phase voltage input not connected; input wire open circuit

Loose connection at a phase input terminal causing detection failure

Input range does not match the actual voltage

Internal sampling circuit malfunction

Troubleshooting

Check the A, B, C phase and neutral line input connections; retighten

Confirm that normal three-phase AC voltage is present at the site

Verify that the transmitter's range matches the site voltage

If the input is normal but the output remains at 4 mA, replace the transmitter

3. Fault: Output signal is fixed at 20 mA and does not change

Possible Causes

Input voltage severely exceeds the range

Incorrect input wiring; excessively high voltage applied

Missing phase or severe imbalance in the three-phase supply causing misjudgment

Damage to the internal conditioning circuit

Emergency Measures

Immediately disconnect power and check if the actual voltage exceeds the rated range

Correct the wiring to prevent accidental connection of high voltage

Check the power grid for phase loss or severe overvoltage

If the output remains at 20 mA after restoring normal voltage, replace the transmitter

4. Fault: Signal drift, slow offset, or inaccurate measurement

Possible Causes

Loose or poor-contact wiring terminals

Sudden changes in ambient temperature and humidity, or condensation inside the cabinet

Long-term operation causing zero-point and full-scale drift

Significant fluctuations in supply voltage

Emergency Measures

Tighten input, output, and power terminals phase by phase

Improve the cabinet environment; enhance moisture, dust, and heat dissipation protection

Recalibrate zero and full-scale points

Stabilize the power supply; install a filter module if necessary

5. Fault: Signal jumping, jitter, high noise, distortion

Possible Causes

Signal cables are unshielded or shielding is improperly grounded

Interference caused by high-voltage cables running parallel to signal cables

Ground potential differences causing ground loop interference

Harmonic interference from on-site inverters or high-power equipment

Troubleshooting

Replace with a two-core shielded cable and ground the shield at one end.

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

Avoid using a common ground for inputs, outputs, and power supplies.

Install ferrite rings on signal cables and optimize the grounding system.

6. Fault: Inconsistent three-phase output, excessive deviation

Possible Causes

Loose or poor contact in the input wiring of one phase

The actual three-phase voltages are inherently unbalanced

Drift in the accuracy of the internal circuitry of one phase

Incorrect phase sequence in the wiring causing abnormal comparisons

Emergency Measures

Check whether the wiring for phases A, B, and C is uniformly tightened

Measure the actual three-phase voltages on-site to confirm grid balance

If the three-phase deviation remains out of tolerance after eliminating external factors, replace the equipment

Standardize phase sequence labeling to prevent wiring errors

7. Fault: Abnormal internal heating of the transmitter after power-up

Possible Causes

Reversed power supply polarity or prolonged overvoltage

Prolonged short circuit in the output circuit

Input voltage consistently exceeding the range

Internal component breakdown or short circuit

Emergency Measures

Immediately disconnect power and check if power supply polarity and voltage are normal

Check for output short circuits and abnormal loads

Confirm that the input voltage is within the rated range

If significant heating is accompanied by output abnormalities, replace the transmitter immediately

8.3 General Troubleshooting Procedure

First, check the power supply: Verify that the DC 24V is within the 18–30V range and that the polarity is correct.

Next, check the wiring: Ensure that the three-phase input, output signal, and common (COM) terminals are securely connected.

Measure the no-load output: It should be close to 4 mA when there is no input.

Apply a rated signal and measure: It should be close to 20 mA at full scale.

After ruling out issues with external wiring, power supply, and load, replace the unit with a spare transmitter for testing.

If the replacement unit functions normally, the original transmitter is faulty; if the issue persists, check the PLC or data acquisition module side.

8.4 Official After-Sales Process

Fault Confirmation

The user should first record the model, range, output specifications, fault symptoms, and on-site conditions, and preliminarily rule out wiring and power supply issues.

Contact After-Sales

Submit fault information through the designated contact person or official after-sales channels, providing photos of the product nameplate, on-site wiring, and measurement data.

Technical Assessment

After-sales engineers will perform a rapid remote diagnosis, provide guidance, or determine whether the fault lies with the product itself.

Repair / Replacement

If the issue is confirmed to be a product defect and the product is within the warranty period, free repair or replacement services will be provided; the user should return the defective unit according to the instructions.

Logistics and Delivery

After the repair is completed or the new unit is shipped, the after-sales team will provide logistics information and track the shipment until the user has successfully installed and is using the product.

Follow-up and Documentation

Once the equipment is back in operation, the after-sales team will conduct a follow-up call, create a fault resolution record, and continue to provide technical support.