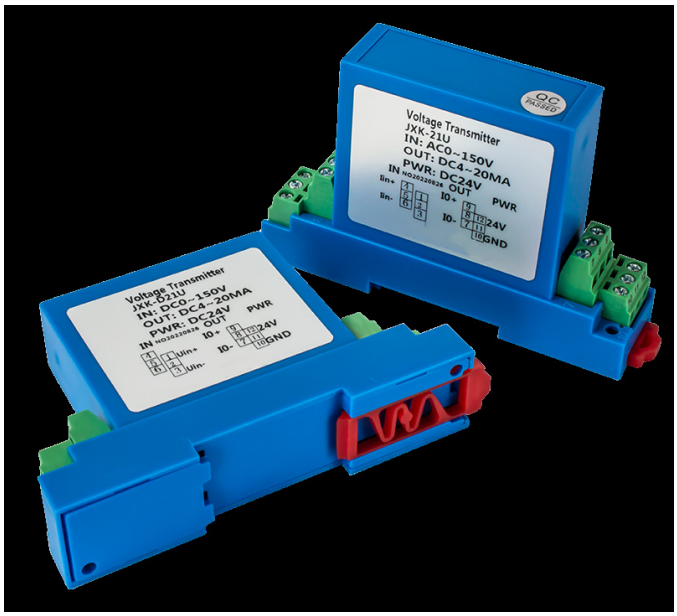
JXK-21-Z Ture RMS AC/DC Current & Voltage Transmitter

Product Introduction

The True RMS AC/DC Current and Voltage Transmitter is a high-precision signal conditioning device designed to measure and convert alternating current (AC), direct current (DC), voltage, and other electrical parameters into standardized analog output signals. By adopting advanced true root mean square (True RMS) measurement technology, this transmitter accurately captures the effective value of complex waveforms, including non-sinusoidal signals, ensuring reliable data transmission for industrial automation, power monitoring, and process control systems.



Engineered for versatility and stability, this transmitter supports universal AC/DC input ranges and provides isolated, linear output signals such as 4–20 mA, 0–10 V, or 0–5 V. Its robust design features high dielectric strength isolation between input, output, and power supply, effectively suppressing ground loops and electromagnetic interference. With a wide operating temperature range and DIN-rail mountable housing, it is ideally suited for integration into control cabinets, PLC systems, SCADA networks, and smart grid applications across global markets.

Key Features

True RMS Measurement: Supports dual acquisition modes (Total RMS & AC-only) for complex waveforms, including half-wave rectifications and signals with DC offsets.
90° Dual-PCB Design: Physical partition of signal sampling and power processing to minimize electrical noise and enhance reliability.
3-Way Galvanic Isolation: Complete isolation among Input, Output, and Power Supply (2kV DC / 1 min).
12-Pin Full-Function Terminal Block: Unified connection layout for power, input, multi-format output, communication, and mode switching.
Multi-Output Versatility: Supports 4–20mA, 0–10V, 0–5V, RS485 (Modbus), and CAN bus.
Industrial Grade Protection: Built-in input overload protection, output overcurrent limit, short-circuit protection, power reverse polarity protection, and wide supply voltage input.

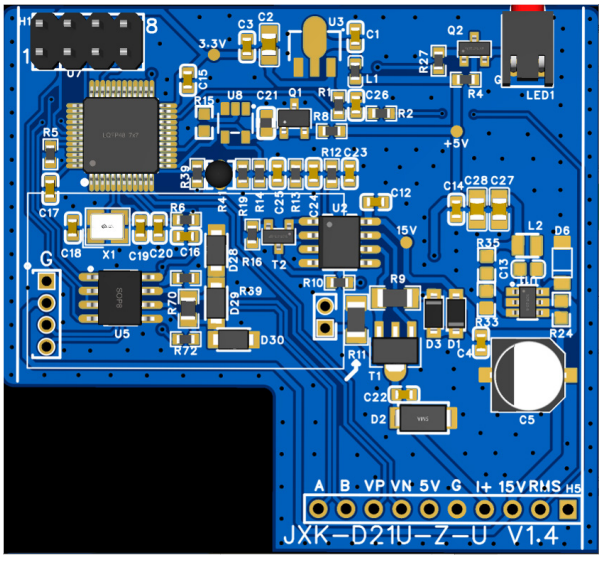
Typical Applications

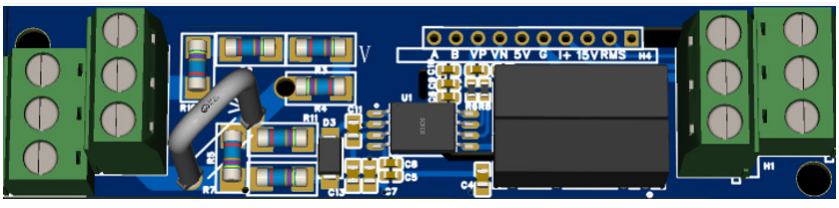
Industrial Automation: Signal acquisition for motor control, variable frequency drives (VFDs), and manufacturing execution systems.
Power Monitoring Systems: Real-time monitoring of grid parameters, power quality analysis, and energy management in substations.
Smart Grid & Renewable Energy: Integration into solar inverters, wind power converters, and smart metering infrastructure.
Building & Infrastructure: Electrical safety monitoring for commercial buildings, data centers, and transportation hubs.
Equipment Protection: Overcurrent and overvoltage protection feedback loops for critical industrial machinery.

Technical Specifications

Parameter	Technical Specification
Input Range (Primary)	Voltage: 0–1000V DC/AC; Current: 0–10A DC/AC
Output Options	Analog: 4–20mA (Default), 0–10V, 0–5V, Digital: RS485, CAN bus
Accuracy Class	±0.5% F.S.
Linearity	0.2% F.S.
Frequency Bandwidth	0–5 kHz
Response Time	≤ 200 ms
Temperature Drift	≤ 250 PPM/℃
Isolation Resistance	DC 2kV, 1 Min (Input / Output / Power)
Power Supply	Standard: DC 24V (18–28V DC)； Optional: AC 220V (60–265V AC), DC 12V
Power Consumption	≤ 2W
Operating Temp.	-20°C to +60°C
Mounting Type	35mm Standard DIN-Rail Mounting

Product Structure





- 90° Dual-PCB Design: Physical partition of signal sampling and power processing to minimize electrical noise and enhance reliability.
- 3-Way Galvanic Isolation: Complete isolation among Input, Output, and Power Supply (2kV DC / 1 min).
- 12-Pin Full-Function Terminal Block: Unified connection layout for power, input, multi-format output, communication, and mode switching.
- Multi-Output Versatility: Supports 4–20mA, 0–10V, 0–5V, RS485 (Modbus), and CAN bus.
- Industrial Grade Protection: Built-in input overload protection, output overcurrent limit, short-circuit protection, power reverse polarity protection, and wide supply voltage input.

RMS Mode: AC+DC & AC-only Dual Acquisition Mode

Code Mode:

AC+DC

Total RMS · Factory Default
Preserves both DC and AC energy and measures the total root mean square value of the signal; readings are not lost when the measured signal contains a DC component.



Solid line: Total RMS including DC offset · Dotted line: AC component

Total RMS (AC+DC) — Factory Default

The total root mean square (RMS) value, including both DC and AC components; in this mode, pure DC signals retain their RMS readings.

Applicable to: Situations where the total effective value needs to be measured.



DC Offset Retention

Pure AC-only — Switch to this mode

First, subtract the average value within the window, then calculate the RMS value of the AC component; in this mode, readings for pure DC are close to zero.

Applicable for: Measuring only the AC component, or for comparison with instruments that use AC measurement definitions.



DC average subtraction

Status Light Recognition (Indicator Cycle: 1 Second)

One flash per second = Total RMS (AC+DC)
Two continuous flashes per second = AC-only

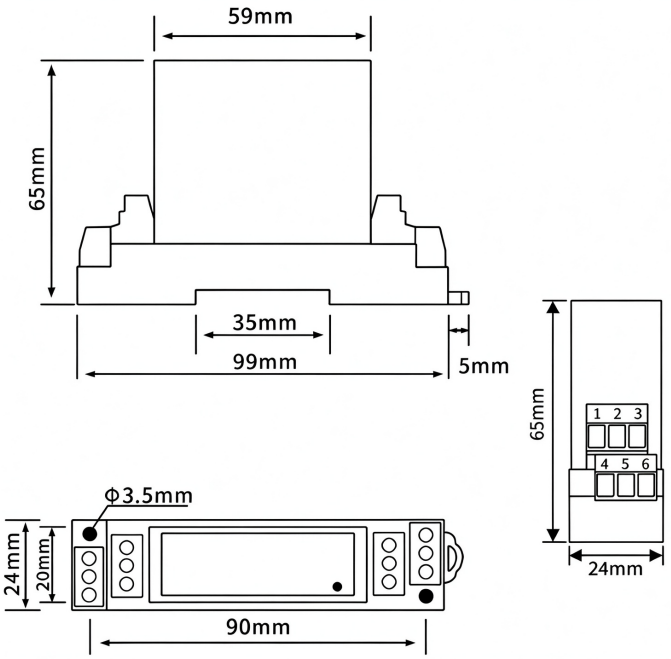
Single flash: On for approximately 100 ms, off for approximately 900 ms; Double flash: On for 100 ms, off for 100 ms, on for 100 ms, off for 700 ms. The indication cycle restarts after a mode change; it is recommended to observe continuously for at least 2 seconds.

Switching method: Pin 8 left floating / Pin 7 shorted

Sales Reminder

If the wrong mode is selected, the readings won't match—in cases involving half-wave rectification or DC bias, we must ensure this is handled correctly for the customer first.

Product Size





Dimensions (Front View): Total height 65 mm, total width 99 mm, base latch width 35 mm, side protrusion 5 mm.
Dimensions (Top View): Body length 90 mm, width 24 mm (terminal area 20 mm), mounting hole Φ3.5 mm.

Scenario-Based Selection Guide

I. Analysis of Key Selection Criteria

1. Signal Type and Measurement Requirements

● Determine whether the primary-side input signal is alternating current (AC), direct current (DC), or a composite signal with a DC offset. For non-sinusoidal signals, inverter outputs, or distorted waveforms, it is recommended to prioritize models that support True RMS measurement (such as the JXK-D21U-Z series) to ensure measurement accuracy.

● Determine the output signal format: For analog output, the industrial standard 4–20 mA (which offers strong noise immunity and is suitable for long-distance transmission) or 0–10 V/0–5 V voltage signals are preferred; if integration with a PLC or a host computer's digital network is required, select models equipped with RS485 (Modbus) or CAN bus interfaces.

2. Number of Channels and Installation Space

● Single-channel models are suitable for distributed measurement points or control cabinets with ample space; if control cabinet space is limited and measurement points are densely packed, it is recommended to prioritize multi-channel integrated or compact dual-board designs (such as the 24mm narrow-body DIN rail model) to save rail space and reduce the overall procurement cost per point.

3. Power Supply Method and System Compatibility

●On-site power conditions determine the power supply selection: For standard control cabinets, prioritize a 24 V DC (18 V–28 V wide voltage range) safety power supply; when only mains power is available on-site, select 220 V AC (60 V–265 V wide voltage range); for mobile devices or battery-powered applications, choose the 12 V DC specification.

4. Safety, Explosion Protection, and Electrical Isolation

●If the operating environment involves flammable or explosive gases or dust (e.g., petrochemical, mining, and fine chemical industries), it is mandatory to strictly select isolation safety barrier products with intrinsically safe (Ex) certification; it is strictly prohibited to install general-purpose transmitters directly in explosion-hazard zones.

●The isolation level must match the on-site power grid environment: In applications involving high-voltage measurements or significant ground potential differences, products with full three-terminal isolation (power supply, input, and output; recommended isolation withstand voltage of 2 kV DC for 1 minute or higher) must be selected to prevent ground loop interference and high-voltage breakdown of the equipment.

5. Installation Environment and Protection Rating

● Consider the on-site environmental temperature, humidity, conductive dust, and strong electromagnetic interference. In standard industrial environments, conventional DIN-rail (35 mm) products (operating temperature: -20°C to +60°C) may be used; for high-temperature, high-humidity, or highly corrosive environments, a protective enclosure must be used, or products with a fully potted structure must be selected.

II. Recommended Product Selection for Industry Applications

1.Chemical and Petrochemical Industries

--Operating Conditions: Flammable and explosive gases, highly corrosive media, high electromagnetic interference, and ground potential differences

--Recommended Selection: Products with intrinsically safe explosion-proof certification must be selected. For power and signal transmission, prioritize 4–20 mA analog transmitters or isolated safety barriers that feature high isolation voltage (2 kV DC or higher), full isolation (three-terminal isolation for input, output, and power supply), and protection against input overload and output short circuits.

2.Power and New Energy (PV/Energy Storage/Wind Power) Industries

--Operating Conditions: Significant voltage and current fluctuations, high-order harmonics, severe DC offset, and large environmental temperature variations.

--Recommended Selection: Select AC/DC voltage and current transmitters that support True RMS measurement and feature low temperature drift (≤250 ppm/°C). For PV busbar or energy storage battery cluster measurements, prioritize models that support switchable modes between total RMS and pure AC-only, and that offer wide-range power supply capabilities.

3.Metallurgy and Heavy Industry Automation

--Operating Conditions: Significant interference from high-power motor starts, high on-site temperatures, severe grid harmonics, and strong mechanical vibrations.

--Recommended Selection: Select highly isolated transmitters with strong anti-interference capabilities, a wide bandwidth (0–5 kHz), and fast response times (≤200 ms). Structurally, a standard 35 mm DIN rail-mounted compact design is recommended, and the enclosure must possess good mechanical strength and flame-retardant properties.

4.Pharmaceuticals and Fine Chemicals

--Operating Conditions: Extremely high requirements for data acquisition accuracy and stability; process control does not allow for signal drift or interruption.

--Recommended Selection: Select signal isolation transmitters with high linearity (0.2%) and high accuracy (0.5% class). In multi-point monitoring systems, it is recommended to configure digital transmitters with an RS485 (Modbus-RTU) communication interface to enable direct connection to SCADA systems for real-time centralized data monitoring.

5.Smart Manufacturing and OEM Equipment Integration

--Operating Conditions: Control cabinet space is limited; cost-effectiveness is a priority; and high demands are placed on installation efficiency and product consistency.

--Recommended Models: Prioritize transmitters with a 90° dual-board design or compact 12-pin full-featured terminal transmitters. These products are compact, support standard DIN rail mounting, and undergo multi-point calibration and power-off/power-on verification before leaving the factory, which significantly shortens on-site commissioning time and enhances equipment integration.

III. Warnings Regarding Common Selection Mistakes

1. Ignoring Isolation Levels and Ground Potential Differences

-- Common Mistake: In high-voltage or complex multi-ground network environments, selecting non-isolated transmitters or those with low isolation levels.

-- Consequences and Recommendations: This can easily lead to signal distortion and zero-point drift due to ground loop currents, and may even burn out downstream PLCs or data acquisition cards during power grid abnormalities. Products with three-terminal full isolation must be selected based on the highest overvoltage level at the site.

2. Incorrect Selection of Signal Range and Acquisition Mode

-- Common Mistake: Ignoring the DC offset component in the measured signal and using a standard average-value response transmitter in variable-frequency or half-wave rectifier circuits.

-- Consequences and Recommendations: Measurement readings will exhibit severe deviations (deviations can exceed 30%). When measuring AC signals containing DC offset, be sure to specify a true RMS transmitter with either “Total RMS (AC+DC)” or

"Pure AC-only" acquisition modes.

3. Neglecting Load Matching and Output Types

-- Common Mistake: Failing to verify the input impedance and power supply type of the receiving end (PLC/DCS acquisition module) during selection (e.g., confusion between two-wire and four-wire systems).

--Consequences and Recommendations: Long-distance transmission of voltage signals can cause severe voltage drops, while excessive load resistance in current signal outputs can result in insufficient drive capability. Before purchasing, confirm the receiving end's interface specifications (e.g., 4–20 mA load resistance typically requires ≤500 Ω).

4. Incorrect Selection of General-Purpose Models for Explosion-Proof Environments

--Common Mistake: To reduce procurement costs, standard industrial-grade transmitters are used directly in areas containing hazardous chemicals or flammable gases.

--Consequences and Recommendations: This poses significant safety hazards and compliance risks, as it may generate electrical sparks that could lead to safety incidents. In hazardous areas, it is mandatory to select isolation safety barriers with explosion-proof certification.

IV. Customized Services and Non-Standard Solutions

1. Customization for Special Signal Ranges

--- For ultra-high voltage (≥1000 V DC/AC), weak currents, or special non-standard input ranges (e.g., 0.5–4.5 V, specific non-linear sensor inputs), we provide factory-level hardware attenuation/amplification circuit customization and software linear calibration services.

2. Customization for Non-Standard Operating Conditions and Environments

--- For extreme cold or high-temperature conditions (e.g., wide temperature ranges from -40°C to +85°C), high-altitude regions, or highly corrosive marine climates, we provide thickened coatings of triple-proof varnish (moisture-proof, salt-fog-proof, and mold-proof), full circuit potting protection, and customized selection of industrial-grade components.

3. Multi-Channel and Multi-Interface Integration Solutions

--- To meet the high-density data acquisition needs of original equipment manufacturers (OEMs), we offer custom multi-channel input/output centralized processing boards, or integrate analog data acquisition with dual-redundant digital communication (RS485 + CAN) into a single module, greatly simplifying on-site wiring and reducing overall system costs.

Installation and Commissioning Specifications

I. Pre-Installation Preparation

1. Verification of Accessories and Factory Specifications

---Verify Nameplate Specifications: After unpacking, carefully verify the model number, input signal range (e.g., 0–1000 V AC or 0–10 A AC), output signal specifications (e.g., 4–20 mA / RS485), and power supply (e.g., 24 V DC) on the product label to ensure they match the on-site design drawings.

--- Check for Physical Integrity: Inspect the housing, DIN rail clips, and terminal blocks for damage, and ensure that labels are intact and have not been altered.

2. Environmental Inspection

--- Operating Environment Requirements: Confirm that the installation environment is free from severe vibration, strong electromagnetic interference, conductive dust, and corrosive gases.

--- Temperature and Heat Dissipation Space: The operating ambient temperature should be maintained within the range of -20°C to +60°C. When multiple devices are installed in close proximity, it is recommended to leave a heat dissipation gap of ≥ 10 mm between them.

3. List of Common Tools

--- Installation Tools: Screwdrivers (PH1 Phillips and 2.5mm flathead), wire strippers, terminal crimping pliers, insulation crimping tool (for tubular pre-insulated terminals).

--- Testing and Inspection Tools: Digital multimeter (recommended accuracy of 4.5 digits, supporting DC/AC true RMS measurement), adjustable DC regulated power supply, signal generator/standard signal source.

4. Safety Precautions

--- Power-Off Operation: Never perform wiring while the system is energized! All installation and wiring procedures must be carried out with the power supply and input signals disconnected.

--- High-Voltage Protection: When sampling high voltages (e.g., 0–1000 V), the input-side wires must be industrial-grade double-insulated wire or insulated cable that meets the corresponding voltage withstand rating (≥1 kV).

II. Standard Installation Steps

1. Mounting on a Rail (35mm DIN Rail)

---Installation: First, hook the rail slot on the top of the transmitter onto the upper edge of a standard 35mm DIN rail. Then, press the bottom firmly downward toward the rail until you hear a “click”; the red latch at the bottom will automatically lock onto the rail.

---Removal: To remove the device, insert a flathead screwdriver into the red pull-tab latch at the bottom and gently pry the tab downward to release the device from the rail.

2. Wiring Specifications (Port and Terminal Identification)

---Strictly Distinguish Functional Areas: The transmitter features a 12-pin terminal block arranged in left and right columns. Before wiring, strictly follow the definitions printed on the back:

Terminal	Definition	Description
Left-size Terminals 1–6	1	Signal Acquisition Input (Positive)
	2	N/A
	3	Signal Acquisition Input (Negative)
	4	RS485-A/CAN-H
	5	N/A
	6	RS485-B/CAN-L
Right-side Terminals 7-12	7	Current Signal Output (Negative)/Voltage Signal Output (Negative)
	8	Mode Switching Pin; short to Pin 7 to switch the acquisition mode.
	9	Current Signal Output (Positive)/Voltage Signal Output (Positive)
	10	Power Supply (Negative)
	11	N/A
	12	Power Supply (Positive)

3. Grounding and Shielding Requirements

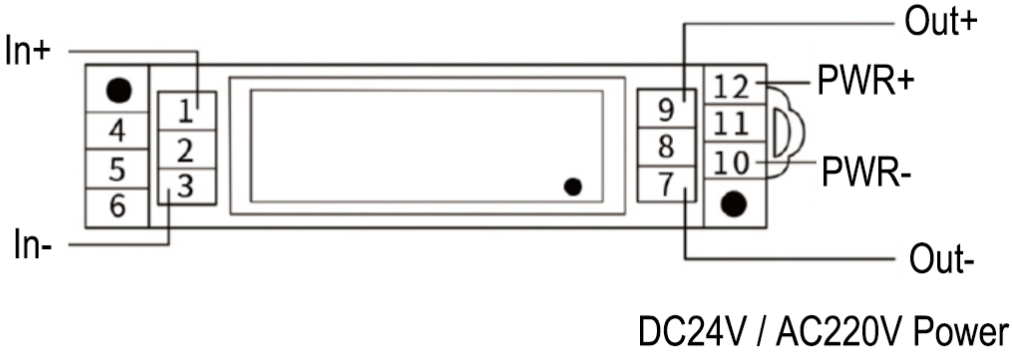
---Shielded Cable Handling: Communication cables (RS485/CAN) and low-voltage analog signal cables must use shielded twisted-pair cables. The shield must be grounded at a single point (typically at the PE ground terminal in the control cabinet); never ground both ends to avoid ground loop current interference.

---System Grounding: The transmitter’s power supply GND and signal line ground must be wired according to the isolation instructions. Never forcibly short-circuit the input ground to the output ground, as this will compromise the 2 kV isolation barrier.

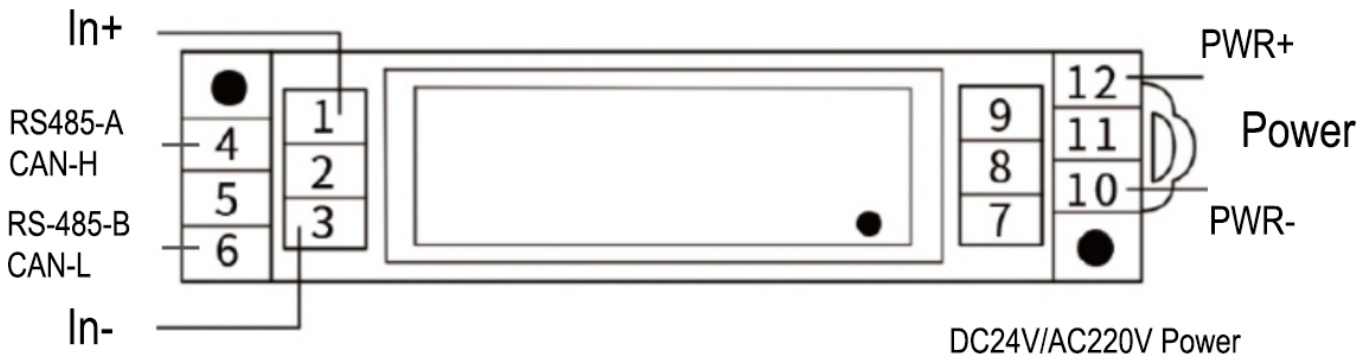
III. Standard Wiring Diagrams and Definitions

1. Terminal Layout Diagram and Wiring Definitions

Analog Signal Output:



The power supply must be connected strictly in accordance with the wiring diagram.



▶ The power supply must be connected strictly in accordance with the wiring diagram.

2. Wiring Specifications by Function

----Power Supply Wiring: Connect Pin 12 to DC +24V and Pin 10 to DC 24V GND.

----Analog Output Wiring (4–20 mA / 0–10 V): Connect Pin 9 to the PLC/data acquisition module's AI+ (positive current/voltage input), and Pin 7 to AI- (signal ground).

----Data Acquisition Mode Selection Wiring (RMS Mode Switching): General RMS Mode (AC+DC, factory default): Leave Pin 8 floating.

----Pure AC-only Mode: Use a jumper wire to directly short-circuit Pin 8 to Pin 7 (Out-).

----Digital Communication Wiring (RS485): Connect Pin 4 to the A(+) conductor of the shielded RS485 twisted-pair cable, and Pin 6 to the B(-) conductor. If this is a bus terminal node, an external 120Ω terminating resistor must be connected as needed.

3. Comparison Table of Common Wiring Practices: Correct vs. Incorrect

Wiring Scenarios	Correct Method	Incorrect Method	Resulting Hazards/Failures
Power Supply Polarity	Pin 12 is connected to P+, Pin 10 is connected to P-	Pin 12 and Pin 10 are reversed	Reversed polarity protection prevents the device from powering on
Isolation Breach	The input (Pins 1/3) & output (Pins 7/9) wiring are completely independent.	Connecting Pin 3 (In-) & Pin 7 (Out-) to ground together	Breaches the 2 kV isolation barrier, introducing ground-loop interference and potentially burning out the data acquisition card.
Mode Switching	Short Pin 8 to Pin 7 only when pure AC measurement is required.	Accidentally connecting Pin 8 to Pin 12 (positive power supply)	This may cause damage to internal logic bits or prevent the mode from being correctly detected.
Shield Grounding	Communication/signal shielding cables are grounded at one end on the PLC side	Shielding cables are grounded at both ends or left floating	Grounding at both ends creates loop currents, leading to signal fluctuations or packet loss

IV. Power-On Commissioning Procedure

1. No-Load Test (Static Power-On Check)

--- Disconnect the signal input terminals (Pins 1/3) and apply only a 24 V DC power supply to Pins 12/10.

--- Observe the status indicator: Verify that the unit's LED indicator is flashing normally (single or double flash, with a 1-second cycle).

---Zero-Point Output Measurement: Use a multimeter to measure the output at Pins 9/7. For the 4–20 mA specification, the output should be a stable 4.00 mA ± 0.05 mA; for the 0–10 V specification, the output should be 0.00 V.

2. Acquisition Mode Verification (Based on Status Lights)

---Total RMS (AC+DC) mode: The indicator flashes once per second (on for 100 ms / off for 900 ms).

---Pure AC-only Mode: The indicator light flashes twice continuously per second (on for 100 ms / off for 100 ms / on for 100 ms / off for 700 ms).

---Mode Switching Note: After changing the wiring on Pin 8, observe the LED status light continuously for at least 2 seconds to confirm that the mode has taken effect.

3. Signal Voltage Verification and Accuracy Calibration

---Applying Standard Signals: Use a standard signal source connected to the input terminals (Pins 1/3) to sequentially input 25%, 50%, 75%, and 100% full-scale signals.

---Measure Corresponding Output: Check whether the output current/voltage at Pin 9/7 follows a linear relationship (e.g., a 50% input corresponds to a 12.00 mA output).

---Accuracy Fine-Tuning (if using a host computer or potentiometer): If systematic wiring voltage drop errors exist on-site, use calibration software or the device's fine-tuning mechanism to perform system-level zero and gain calibration.

V. Installation Precautions (Five Strict Prohibitions)

1. Strictly Prohibit Overvoltage Supply: It is absolutely prohibited to accidentally connect 220V AC mains power directly to the 24V DC power supply terminals (Pins 12/10), as this will burn out the internal power isolation module.
2. Strictly Prohibit Hot-Swapping: Never insert or remove terminal screws or forcibly strip wires while the device is powered on to prevent high-voltage arcing or accidental contact causing a short circuit.
3. Avoid High-Voltage Interference and Parallel Cabling: The transmitter's input/output signal cables must be kept away from high-power inverters, contactors, and high-voltage AC power cables. Never run them parallel to high-voltage cables in the same cable tray (maintain a distance of at least 20 cm within the same tray, or cross them at a 90° angle).
4. Do not compromise the moisture-proof seal: The transmitter features an integrated sealed structure; do not tear off the housing seal or disassemble the housing without authorization. When used in humid environments or outdoor control cabinets, a waterproof control box with an IP65 protection rating or higher must be installed, and waterproof elbows or gland fittings must be used at the cable entry points.
5. Prohibit prolonged operation beyond the full scale range: Although the device is equipped with overload protection, prolonged operation at conditions exceeding 150% of the rated range should be avoided to prevent internal sampling resistors from overheating, which could lead to increased temperature drift or component aging.

Recommendations for Daily Use & Operations and Maintenance

I. Key Points for Routine Inspections

1. Visual Inspection and Operating Indicator Status Check

--- LED Status Indicator Check: Observe the LED status indicators on the transmitter panel to verify that the current operating mode and flashing pattern are normal:

--- Total RMS (AC+DC) Mode: Should maintain a single flash per second (on for 100 ms / off for 900 ms).

---Pure AC-only Mode: Should maintain a continuous double flash twice per second (on for 100 ms / off for 100 ms / on for 100 ms / off for 700 ms).

---If the light remains constantly on, constantly off, or flashes irregularly, record this immediately and check the power supply or internal protection status. Enclosure and Structural Inspection: Check the enclosure for discoloration, deformation, or cracks; confirm that the rail clips are securely fastened with no looseness; and ensure that product labels are not torn or altered.

2. Signal Stability and Real-Time Data Monitoring

---Troubleshooting Sudden Data Spikes and Periodic Fluctuations: Refer to the monitoring interface on the host computer (PLC/DCS) to verify that the real-time measurement data is stable. If irregular sudden spikes, periodic fluctuations, or signals locked at the 4 mA or 20 mA extremes are detected in the output current/voltage signals, focus the investigation on fluctuations in the front-end sampling source or strong electromagnetic interference.

---Communication Status Monitoring (for RS485/CAN Communication Models): Check the packet loss rate on the communication bus to confirm that Modbus/CAN readings match the analog output values and that there are no frequent message timeouts.

3. Temperature, Humidity, and Environmental Monitoring

---Operating Ambient Temperature: Use an infrared thermometer to periodically measure the surface temperature of the transmitter housing and the ambient temperature inside the control cabinet to ensure the operating temperature remains within the rated range of -20°C to +60°C.

---Verification of Heat Dissipation in Tightly Packed Installations: For control cabinets where multiple devices are installed closely side-by-side, if the internal temperature rises excessively (exceeding 50°C), check the operation of the cabinet fans or adjust the installation spacing (maintaining a ≥10 mm heat dissipation gap).

---Environmental Humidity and Condensation Inspection: Check the control cabinet for moisture buildup or condensation, and

ensure that no conductive dust or corrosive gases accumulate in the environment.

II. Regular Maintenance Plan

1. Cleaning and Maintenance Schedule (Recommended: Once per month to once per quarter)

--- Surface Dust Removal: Use an anti-static soft-bristle brush or clean, low-pressure dry compressed air (≤0.2 MPa) to remove dust accumulated on the transmitter housing and terminal blocks to prevent dust from absorbing moisture, which could lead to reduced insulation performance or localized short circuits.

---Prohibited Actions: Never use damp cloths, strong acidic or alkaline cleaning agents, or organic solvents (such as alcohol or acetone) to wipe the transmitter housing or labels.

2. Wire Tightening and Terminal Inspection (Recommended once every six months)

---Tightening to Prevent Loosening: Screw terminals may become loose due to mechanical vibration at the site or thermal expansion and contraction. During maintenance, with the power disconnected, use a screwdriver to retighten and verify the 12P input, output, power, and communication terminal screws (recommended tightening torque: 0.5 N·m).

---Inspection for Oxidation and Contact Condition: Check the stripped copper wires and cold-pressed terminals for signs of oxidation (blackening), loose connections, or overheating and annealing. If damage is found, cut off the old wire ends and re-crimp the cold-pressed terminals.

3. Accuracy Retest and Calibration (Recommended once a year)

---Three-Point/Five-Point Accuracy Retest: Disconnect the transmitter from the field wiring and connect it to a standard calibration platform. Apply standard signals at 0%, 25%, 50%, 75%, and 100% of full scale, in sequence.

---Zero and Full-Scale Deviation Verification: Verify whether the error in the analog output (4–20 mA / 0–10 V) still meets the ±0.5% accuracy class and 0.2% linearity requirements.

---Out-of-Tolerance Correction: If retesting reveals a slight drift in accuracy, use standard host computer debugging software to reprogram the zero and full-scale calibration parameters to ensure output consistency and repeatability.

III. Long-Term Maintenance and Protection Techniques for Extreme Environments

1. Optimizing Dust and Moisture Protection

---Install a Sealed Enclosure: In environments with high humidity, high dust levels, or high salt fog (such as chemical plants, cement plants, and offshore platforms), the rail-mounted transmitter must be installed entirely within a sealed distribution box with an IP65/IP66 protection rating.

---Install Temperature and Humidity Control Components: It is recommended to install automatic temperature and humidity controllers along with heating and dehumidification modules inside the enclosure. These will automatically activate heating and dehumidification when the relative humidity inside the enclosure exceeds 75% or when temperature differentials create conditions conducive to condensation, thereby preventing moisture-induced corrosion of circuit boards and terminal blocks.

2. Upgraded Interference Protection

--- Signal Cable Shielding and Conduit Protection: Low-voltage analog signal cables and RS485/CAN communication cables must be routed entirely through metal conduit for protection, and the shielding must be centrally grounded at a single point on the control cabinet side to prevent electromagnetic interference generated by high-power inverters or high-frequency equipment.

--- Addition of Ferrite Chokes and Surge Protection: In environments with strong interference, high-frequency ferrite chokes (wound 2–3 times) may be installed on the input/output signal lines near the transmitter end; in areas prone to lightning strikes or for outdoor cable installations, surge protection devices (SPDs) should be installed on both the power and signal lines.

3. Protective Measures for Extreme Environments (High/Low Temperatures, Severe Vibration)

---Heat Dissipation Precautions for High-Temperature Conditions: It is strictly prohibited to install the transmitter in direct contact with high-power heating elements (such as braking resistors, transformers, or frequency-constant inverters). In high-heat areas, cabinet-top fans or industrial air conditioners must be installed.

--- Vibration-Resistant Reinforcement Techniques: When installing near equipment subject to strong vibrations—such as stamping machines or diesel generator sets—rubber vibration-damping pads should be added to the rail base. Terminal cables must be routed with appropriate stress-relief bends (S-shaped bends) and secured to structural components with cable ties to prevent fatigue fractures of internal metal parts in the terminals caused by prolonged vibration and tension.

Troubleshooting & Emergency Response

I. List of Common Faults and Analysis of Causes

Fault Symptom: No output upon power-up

Possible Causes:
1. The power supply is not connected or the voltage is out of range (e.g., 24V mistakenly connected to 220V or connected in reverse)
2. Loose connection at the power supply terminals or the fuse has tripped

Major Components/Terminals Involved: Power supply terminals (Pin 12 / 10)

Symptoms: Significant signal output deviation / drift

Possible Causes:
1. Incorrect acquisition mode selection (wrong selection between Total RMS and AC-only; half-wave/DC offset not processed)
2. Ground loop interference or lack of isolation at the input/output terminals
3. Increased temperature drift due to prolonged operation beyond the measurement range

Major Components/Terminals Involved: Mode Switching Terminal (Pin 8), Input Terminals (Pins 1/3)

Symptom: Indicator light malfunction / not flashing

Possible Causes:
1. Supply voltage is too low (below DC 18V or AC 60V)
2. Internal firmware reset failure or motherboard hardware failure

Major Components/Terminals Involved: Status LED, power supply terminals

Fault Symptom: Periodic fluctuations / distortion in measured values

Possible Causes:
1. Strong electromagnetic radiation interference (near inverters or high-power contactors)
2. The shielding layer of communication cables or analog signal cables is not grounded at one end
3. Frequency band exceeds the range (>5 kHz)

Major Components/Terminals Involved: Signal input/output cables, shielding layer

Fault Symptom: Output is locked or clamped

Possible Causes:
1. The trigger input overload protection or output overcurrent limit protection has been triggered
2. A prolonged short circuit at the output has triggered the internal self-protection mechanism

Major Components/Terminals Involved: Output terminals (Pin 9 / 7)

II. Step-by-Step Troubleshooting and Remedial Measures

Fault 1: No output upon power-up or indicator light does not illuminate

Step 1 (Power-Off Inspection): Immediately disconnect the system's main power supply and check whether the input power cord is securely plugged into Pin 12 (P+) and Pin 10 (P-) on the right side.

Step 2 (Voltage Measurement): Use a multimeter set to the AC/DC range to measure the voltage at the terminal block. Verify that the voltage for the 24V DC model is within the range of 18V–28V (for the 220V AC model, within the range of 60V–265V).

Step 3 (Reverse Polarity Check): Check whether the internal reverse polarity protection was triggered due to a previous reversal of the power supply's positive and negative terminals. If the fuse has blown or there is no voltage output, contact the manufacturer to return the unit for repair.

Fault 2: Output signal does not match the actual multimeter reading / Reading is too low

Step 1 (Mode Verification): Observe the flashing pattern of the panel LED indicator. If the signal under test contains a DC offset or is a half-wave rectified waveform, confirm whether the device is currently in "Total RMS (single flash)" or "Pure AC-only (double flash)" mode.

Step 2 (Check Short-Circuit Status): If measuring a pure AC component, check whether Pin 7 and Pin 8 are reliably short-circuited; if measuring total RMS, confirm that Pin 8 is completely floating.

Step 3 (Zero and Full-Scale Calibration): Use a standard signal source to input 0% and 100% signals, and verify that the analog output (4–20 mA / 0–10 V) exhibits a linear response.

Fault 3: Severe signal jitter or electromagnetic interference

Step 1 (Check Wiring): Confirm that signal wires are kept at least 20 cm away from power cables and inverter output wires, or that they are routed at a 90° angle to each other.

Step 2 (Check Grounding): Verify that shielded signal cables are grounded at only one end (on the control cabinet side) to prevent ground loop currents caused by grounding at both ends.

III. Emergency Alternatives (Minimizing Downtime Losses)

1. On-site Temporary Direct Connection (Voltage Measurement Only):

If the transmitter unit's hardware is damaged and no spare parts are immediately available, provided safety can be ensured, the front-end high-voltage sampling line may be temporarily disconnected. A high-precision true RMS digital multimeter can then be connected directly to the control loop to enable manual reading and monitoring, thereby maintaining temporary production.

2. Rapid Hot-Swap Replacement with Spare Parts:

Use the JXK-D21U-Z spare module, which conforms to a standardized specification. Since the product undergoes standard three-point calibration at the factory, after replacing it with a new unit of the same model, simply verify the short-circuit status of Pin 8 and the wiring sequence of the 12P terminals to put it into service immediately—no cumbersome reprogramming is required.

IV. After-Sales Service and Warranty Guidelines

1. Criteria for Determining Malfunctions:

--- Provided that wiring, power supply, and environmental requirements specified in this manual are strictly followed, the product is covered under warranty in the event of non-user-induced accuracy deviations, internal isolation failure, or unexplained component damage.

2. Unauthorized Disassembly Strictly Prohibited:

--- The transmitter features a fully integrated, sealed design. Users are strictly prohibited from disassembling the housing or tearing off or altering the product's anti-counterfeiting label. Any damage resulting from unauthorized disassembly, excessive pressure beyond specified limits, or wiring errors is not covered by the free warranty.

3. Repair and Technical Support Process:

---Information Required: When reporting a repair, please provide the complete product model, serial number (SN), a description of the fault symptoms observed on-site, and photographs of the actual wiring. Contact Information: Please contact the official channel where you purchased the product, the supplier's customer service email, or visit the company's official website (e.g., www.qidiansensor.com) to obtain real-time technical support and instructions for returning the product for repair.