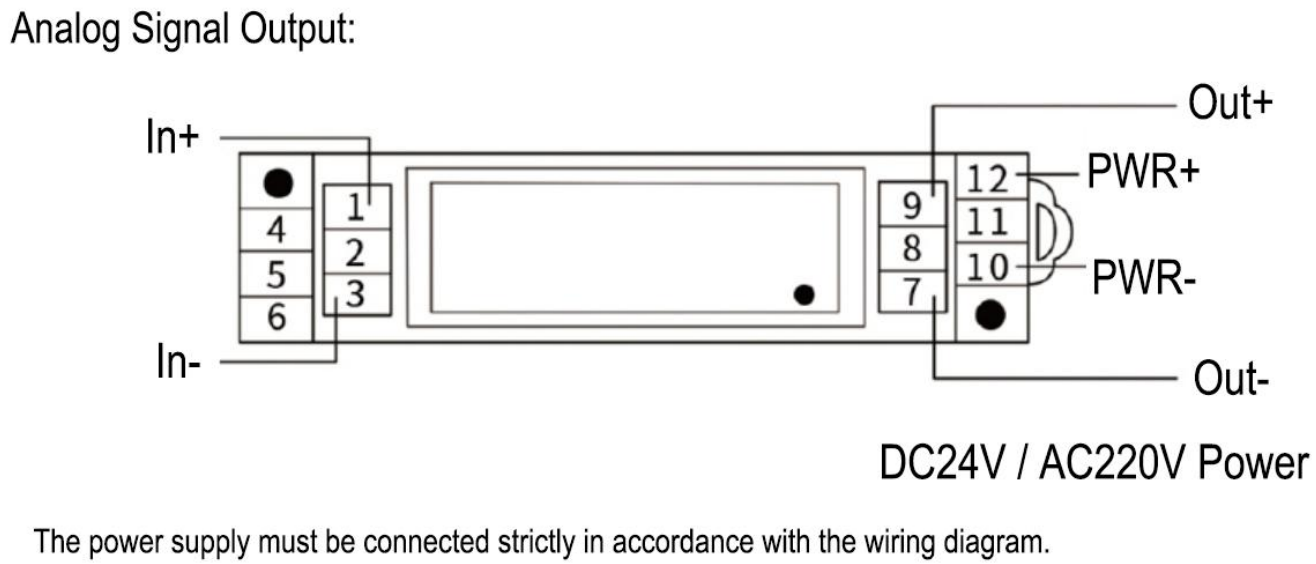
Quick Reference

1.1Typical Wiring Diagrams

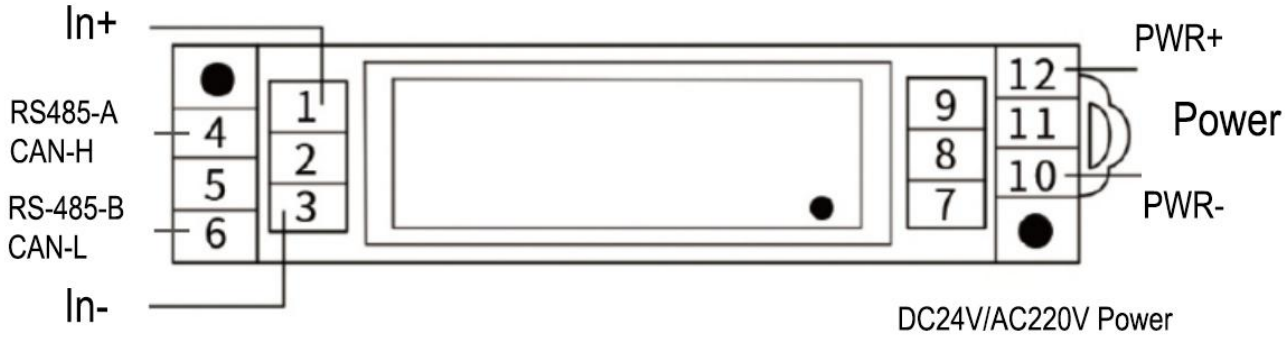
Warning: Be sure to disconnect all power sources before wiring! Verify that the on-site input type (AC/DC) matches the instrument's specifications.

1) Two-wire loop power supply (4–20 mA current output) is suitable for PLC analog input modules (with 24 VDC power distribution capability) or an external 24 V power supply.



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

2) Four-wire independent power supply (RS485 Modbus RTU & CAN output) is suitable for applications requiring high isolation, in environments with strong interference, or in scenarios with independent AC/DC power supplies.



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

1.2 Standard Power-On Commissioning Procedure (Step-by-Step Commissioning)

1. Visual Inspection and Specification Verification: Check that the input range, output type, and operating power supply listed on the nameplate match the on-site design.
2. Hardware Wiring: Connect the power supply cables, signal input cables, and output cables according to the corresponding wiring diagram.
3. Insulation Test Before Power-On: Use a multimeter to verify that there is no short circuit between the input terminals and the power supply terminals.
4. Power-On Observation: Observe the status indicator (POWER/RUN) immediately upon power-up.
5. Zero-Point Calibration (No Signal Condition): When the primary side is disconnected or there is no current/voltage input, the measured output should be 4 mA ± 0.05 mA (or 0.00 V).
6. Power-On/Load Calibration: Apply a known signal (e.g., 50% of the rated value) and verify the output current/voltage or the PLC display reading.

1.3 LED Status Indicator

The system displays the currently selected RMS acquisition mode through different flashing patterns; the indication cycle for both modes is 1 second. The mode can be switched by shorting pins 7 and 8 externally.

1.3.1 Status LED & Acquisition Mode

Status Lights	**Acquisition Mode**	**Mode Status and Meanings**
One flash per second	RMS (AC+DC)	Factory default: Retains both DC and AC energy; suitable for total RMS measurement.
Flashes twice continuously per second	AC-only	7, 8 Short-circuit mode: Removes the DC average and measures only the AC component.

Single flash: On for approximately 100 ms, off for approximately 900 ms; Double flash: On for approximately 100 ms, off for approximately 100 ms, on again for approximately 100 ms, off for approximately 700 ms, repeating in a cycle. The indication cycle restarts when switching modes; it is recommended to observe continuously for at least 2 seconds.

2. Mode Selection for Half-Wave and DC-Offset Signals

Total RMS includes both DC and AC components; AC-only first subtracts the average value within the window, then calculates the effective value of the AC component. Pure DC should be close to zero in AC-only mode, while its effective value is retained in Total RMS mode.

The signal under test contains both DC and AC components. Select “Total RMS” when measuring the total RMS value; select “AC-only” when measuring only the AC component or when comparing with instruments that use the AC measurement definition.

Before comparing with a standard instrument, verify that both instruments are set to the same AC/AC+DC mode, frequency band, and input waveform peak, and check that the front end is not saturated. A double-flashing status light does not guarantee that the reading will necessarily match that of any other instrument.

Comprehensive Q&A

Q1: After wiring a two-wire transmitter, the output displays a negative value or remains fixed at 3.8mA. What is the cause?

Authoritative Answer:Troubleshooting: The 4 mA in a two-wire transmitter represents the static zero-point operating current. If the output is below 4 mA (e.g., 3.8 mA or lower), this is typically due to reversed loop polarity, a supply voltage below the minimum startup threshold (usually 12 VDC), or reverse signal polarity during DC measurement, causing the sampling circuit's lower output limit to saturate.

Solution:

- Use a multimeter set to the DC voltage range to measure the actual voltage at the transmitter terminals and ensure it is greater than or equal to 18 VDC ~ 24 VDC.
- Check the positive and negative terminals of the DC signal input to ensure that the high potential is connected to the positive terminal of the current/voltage input.

Q2: Why does a True RMS transmitter show an output of 4.08 mA (with a slightly high zero point) when measured with a multimeter in the absence of an input signal?

Authoritative Answer:

Troubleshooting: True RMS chips contain internal circuits for square root and power-of-n operations. When the signal is extremely small (within the dead zone), noise induced by stray electromagnetic fields in the environment is mistakenly interpreted by the True RMS circuit as active energy, resulting in a slight "noise floor" at the zero point.

Solution:

- Ensure that the transmitter housing and shielded cables are reliably grounded at the control cabinet end to shield against high-frequency ambient noise.
- High-quality industrial-grade transmitters are equipped with a built-in software zero-clipping function. If the deviation exceeds the permissible accuracy limit (e.g., >4.08 mA), you can fine-tune the zero point by holding down the Zero button on the panel or perform a zero-point self-calibration using the RS485 configuration tool.

Q3: Why do the current and voltage readings on the digital meter keep fluctuating and remain unstable after connecting to the inverter's output terminal?

Expert Answer:

Troubleshooting: The inverter's output contains high-frequency PWM chopping (carrier frequencies ranging from several kHz to over ten kHz). If the transmitter does not use a wideband True RMS chip with a high rejection ratio, or if the signal transmission is not shielded, high-frequency common-mode interference will couple into the sampling circuit.

Solution:

- Ensure that the transmitter's signal cables use shielded twisted-pair cables, and that the shield is grounded at only one end—on the PLC control cabinet side.
- Keep the signal cables away from the inverter's power output cables and avoid running them parallel to each other.
- Increase the damping factor in the transmitter's parameters to smooth out high-frequency ripple.

Q4: How can I quickly troubleshoot an RS485/Modbus transmitter that cannot communicate with the PLC on-site?

Authoritative Answer:

Four-Step Rapid Troubleshooting Method:

- Check the physical wiring: Do not reverse the A and B lines on the RS485 connection.
- Verify the baud rate and station number: Ensure that the transmitter's baud rate (e.g., 9600 bps), data bits, stop bits, and parity bit (e.g., N, 8, 1) exactly match the PLC serial port master station parameters.
- Check bus termination: If the bus length exceeds 100 meters or there are more than 10 nodes on the bus, a 120Ω terminating resistor must be connected in parallel at both ends of the bus.
- Measure Voltage to Ground: Use a multimeter to measure the DC voltage between A-GND and B-GND. Under normal static conditions, the voltage from A to ground should be 2.5 V to 3.5 V, and the voltage from B to ground should be 1.5 V to 2.5 V. If the voltage difference is zero or close to 0 V, this indicates a bus short circuit or a chip breakdown.

Q5: Can a universal AC/DC transmitter measure both AC and DC signals simultaneously?

Customer Question: Our equipment sometimes runs on AC and sometimes switches to DC. Do we need to purchase two different models?

Official Answer:

- Expert Explanation: There is no need to purchase two different models. A universal AC/DC true RMS transmitter, which utilizes wide-band sampling and advanced digital signal processing (DSP) technology, has a hardware front end capable of simultaneously responding to both DC components (0Hz) and AC components (covering both power-frequency and high-frequency ranges).
- Application Scenarios: It can seamlessly calculate the comprehensive true RMS value of complex mixed waveforms (such as pulsating DC, rectified AC superimposed on DC, and mixed AC/DC bus voltages). As long as you confirm during selection that its input range covers the highest AC and DC peak values in your system, you can achieve universal interchangeability—one unit can serve the role of two.

Q6: How do I choose between a direct input (e.g., 0–600 V) and an input via a current transformer (0–5 A or 0–10 A)?

Customer Question: The busbar current at the site is very high. Should I purchase a high-current transmitter directly, or should I buy a transmitter with a secondary-side 5A input and use a current transformer?

Expert Answer:

Selection Criteria:

- Secondary-side input type (used with current transformers, such as 0–5 A, 0–1 A, or shunt resistors 0–75 mV): Strongly recommended for high-current/high-voltage applications (e.g., total current >100 A or high-voltage power systems). This solution not only offers lower cost and higher insulation safety but also prevents high voltage and high current from entering the control cabinet via the transmitter itself, making maintenance easier.
- Direct-input type (e.g., built-in through-hole or direct terminal connection, 0–50 A or 0–100 A): Suitable for small- to medium-sized loads, control cabinets with limited internal space, and medium- to low-voltage circuits that do not require external current transformers. Wiring is more intuitive, and it reduces errors caused by intermediate steps.

Q7: What international and industry certifications do the transmitters have? Can they be used directly in export projects?

Customer Question: We plan to export equipment to Europe and North America. What certifications do the transmitters have? Will they pass customs and meet local safety regulations?

Authoritative Answer:

- Authoritative Explanation: High-quality industrial-grade true RMS transmitters are designed in strict compliance with international electrical standards and typically hold the following certifications:
- CE Certification (complies with the EU's EMC Electromagnetic Compatibility Directive and LVD Low Voltage Directive, ensuring legal and compliant use in the European market).
- RoHS Environmental Certification (content of hazardous substances such as lead and mercury complies with international environmental standards).
- ISO 9001 Quality Management System Certification (ensuring controlled production processes and factory aging tests).
- If your project involves special explosion-hazardous industrial sites (such as petrochemical plants or coal mines), you can opt for specially customized versions with Ex d IIB T6 flameproof certification or intrinsically safe (IS) certification.

Q8: Does it support customization for non-standard input and output ranges (such as non-standard DC voltages for charging stations)?

Customer Inquiry: We manufacture high-power charging stations for new energy vehicles and need to measure 0–1,000 VDC, with an output of 0–5 V or specialized CAN/Modbus protocols. Is customization possible?

Authoritative Answer:

- Customization is fully supported. For specialized industries such as new energy, energy storage, and rail transit, manufacturers typically offer flexible, non-standard customization services.
- Customizable Features: The input range can be expanded to 0–1,500 VDC or several thousand amperes; output signals can be customized to 0–5 V, 0–10 V, 4–20 mA, or even dual isolated RS485 (Modbus-RTU) outputs. Customization cycles are typically short, meeting customers' needs for both personalized R&D and mass production.

Q9: What are the differences between DIN rail mounting and panel/wall mounting in terms of seismic resistance and heat dissipation?

Customer Question: Space is limited inside the control cabinet. Is it better to mount the device on a standard 35mm DIN rail or secure it to the base plate with screws?

Authoritative Answer:

- Installation Selection Recommendations: Standard 35mm DIN rail mounting: The most common industrial installation method. Modern high-quality transmitters feature a snap-on, ultra-thin housing design that allows for extremely quick installation and removal, making them ideal for dense arrangements within standard control cabinets.
- Wall-Mounted/Panel Mounting with Fixing Screws: If installing in environments subject to severe mechanical vibration (such as inside wind turbine nacelles, near compressors, or in control cabinets for heavy-duty construction machinery), we recommend prioritizing wall-mounted installation secured with dual-ear screws. This method offers significantly better resistance to mechanical vibration and impact than rail-clip mounting, effectively preventing terminal loosening caused by prolonged vibration.

Q10: Are the input signal, output signal, and auxiliary power supply completely isolated from one another?

Customer Question: In my system, both high-voltage and low-voltage signals pass through the transmitter. Could this cause the PLC to be damaged by high voltage?

Authoritative Answer:

- Industrial-grade, high-quality transmitters must feature a "triple isolation" design (i.e., electrical isolation between the input, output, and auxiliary power supply).

- Isolation Withstand Voltage Specifications: Typically, the isolation withstand voltage reaches up to 2,500 V AC or 3,000 V DC (with some high-voltage models reaching up to 5,000 V). This fully isolated architecture completely blocks high-voltage surges and common-mode interference from the primary power circuit, providing comprehensive protection for downstream PLCs, DCS control systems, and personal safety.

Q11: After connecting the transmitter, the PLC reading exhibits glitches or brief overshoots at the moment of high-current startup. How can this be optimized?

Customer Question: As soon as the motor starts, the current display on the PLC instantly spikes to the maximum value and then drops back down. Is there a way to filter out this transient glitch?

Authoritative Answer:

Authoritative Explanation: This is a normal physical transient response. True RMS transmitters react extremely quickly and can capture current surges at the millisecond level.

Optimization Solution:

- Combined hardware/software filtering: If the customer is only concerned with steady-state operating current, they can appropriately increase the internal digital filter time constant (Damping / Response Time) in the transmitter's configuration software (or via DIP switches/buttons), for example, adjusting it from 200 ms to 1–2 s. PLC-side smoothing:
- Incorporating a first-order inertial filter or a moving average filter algorithm into the PLC's analog signal reception program can effectively eliminate glitches caused by mechanical startup, resulting in a smooth and stable display.

Q12: Is a factory inspection report or calibration certificate included with the shipment?

Customer Question: During project acceptance, the supervising engineer requires a third-party or factory calibration report. Can the manufacturer provide one?

Authoritative Answer:

- Authoritative Explanation: Before leaving the factory, every standard true RMS transmitter must undergo zero-point, linearity, full-scale, and temperature drift testing using a fully automated standard source (such as the Fluke Multifunction Power Calibrator).
- Compliant Delivery: Each product package includes a factory certificate of conformity (QC Passed) and an individual test data card for each unit. For projects with specific statutory metrology requirements, we can arrange for the product to be sent to a nationally accredited third-party metrology testing institution (such as a provincial metrology research institute) to issue an authoritative metrological verification certificate bearing the CNAS mark.

Q13: Will a transmitter experience "zero drift" during long-term continuous operation? How often does it need to be recalibrated?

Customer Question: The transmitter is installed in the factory and runs 24/7. Will its accuracy deteriorate after one or two years of use?

Authoritative Answer:

Authoritative Explanation:

- Due to the slight aging of electronic components and environmental temperature variations, any precision instrument will experience extremely slight long-term drift.
- Maintenance Recommendations: Transmitters that utilize high-quality military-grade components and low-temperature-drift reference sources typically have an annual drift rate controlled within <0.1% FS. For standard industrial applications, it is recommended to perform a routine inspection and calibration of the zero and full-scale points using a standard signal source every

1 to 2 years, in conjunction with major maintenance cycles, to ensure that the control system maintains high accuracy over the long term.

Q14: What are the consequences of terminals being exposed to moisture or dust over a long period of time? How can this be prevented?

Customer Question: The air humidity is high in the chemical plant workshop, and sometimes white crystals or dust can be seen on the terminals. How should they be maintained?

Expert Answer:

Risks and Prevention:

- Consequences: Corrosive gases in the air combine with moisture to form a microscopic conductive layer, leading to increased input/output leakage current, reduced signal accuracy, and even sparking and short circuits between terminals.
- Preventive Measures: Select transmitters with fully sealed enclosures that meet an IP65 protection rating or higher; in highly corrosive environments, maintain positive-pressure ventilation inside the cabinet or place desiccants inside; periodically (e.g., every six months) inspect the dust covers on the terminal blocks and, if necessary, apply an insulating, moisture-resistant conformal coating to the terminal surfaces.

Q15: Will the transmitter be damaged if the input signal exceeds the nominal range (e.g., 150V input for a 100V range)?

Customer Question: I accidentally overloaded the transmitter by 50%. Is the device still usable?

- Authoritative Answer: Authoritative Explanation: High-quality true RMS transmitters are all designed with robust internal overload protection mechanisms.
- Overload Specifications: Typically, transmitters are rated to withstand 1.2 times the nominal value as a continuous overload, as well as a short-term surge overload of 10 times the rated value for a duration of 5 seconds (for current-input types).
- Outcome: During a short-term overload, the output signal will smoothly saturate at the maximum value (e.g., 20 mA full scale) without causing permanent damage to the hardware. Once the overload is resolved, the device will automatically resume normal measurement. However, if the out-of-range condition persists for too long or exceeds the limit (e.g., due to a high-current lightning strike), it may trigger the internal protective fuse.

Q16: If a product malfunctions during the warranty period, what are the manufacturer's after-sales policies and procedures?

Customer Question: What is your after-sales policy if the transmitter I purchase turns out to be defective? Will you replace it or repair it?

Official Answer:

After-Sales Commitment:

- Warranty Period: Standard industrial-grade true RMS transmitters come with an extended 3-year warranty (covering natural damage not caused by human error).
- Streamlined Service Process: If the issue cannot be resolved through remote technical support within the warranty period, the customer may request a return to the factory. Upon receipt, the manufacturer promises to complete inspection, repair, or a direct free replacement within 48 hours and will cover return shipping costs to minimize the customer's downtime losses.