Single-Phase Digital Current Meter & Voltmeter

Core Product Perception

I. Product Definition
Single-phase digital current meters and voltage meters are embedded, panel-mounted single-parameter monitoring instruments, available in two distinct models: the single-phase digital current meter (for measuring single-phase AC/DC current) and the single-phase digital voltage meter (for measuring single-phase AC/DC voltage).

Summary of Core Features:
1. Real-time acquisition of single-phase circuit current/voltage signals; 4-digit red LED display provides direct digital readout of measured values, replacing traditional analog meters and ensuring intuitive readings without visual errors;
2. Supports customizable parameter settings: range, transformation ratio, and decimal point position, making it suitable for measurement scenarios involving external current transformers;
3. Optional additional features: upper and lower limit alarm outputs, RS485 communication (Modbus-RTU protocol), and analog transmitter output (4–20 mA);
4. Panel-mounted snap-in installation; can be directly embedded into switchgear or PLC control cabinets by cutting a hole;
5. Wide-range auxiliary power supply compatible with both AC and DC, suitable for industrial power distribution sites;
6. Hardware features overvoltage and overload input protection, as well as EMC (electromagnetic compatibility) interference resistance, making it suitable for industrial environments with strong electromagnetic interference, such as workshops and power distribution rooms;
7. Each individual meter monitors only a single electrical quantity: the ammeter is dedicated to current measurement, and the voltmeter is dedicated to voltage measurement.

II. Working Principle
Layman's Explanation:
1. Single-phase digital voltmeters and ammeters use internal high-precision sampling circuits to acquire voltage or current signals from the circuit under test:
2. Voltage models: Directly sample the high-amplitude single-phase voltage signal via a voltage divider; current models use an external current transformer to convert the high primary current into a low-amplitude current signal recognizable by the meter;
3. The sampled analog signal is sent to the instrument's internal MCU, where it undergoes A/D (analog-to-digital) conversion to transform the continuous analog electrical signal into a digital signal;
4. The MCU performs calculations based on preset transformation ratios and range parameters to determine the actual voltage or current value;
Once the calculation is complete, the MCU drives the red LED display on the panel to refresh and display the measurement results in real time;
5. When the optional function is enabled, the meter simultaneously checks whether the measured value exceeds the upper or lower threshold limits (triggering an alarm) or uploads the data via RS485 to a PLC, industrial control screen, or SCADA host system.

3. Core Value
Designed for online monitoring of single-phase voltage and current in industrial power distribution panels, equipment control cabinets, and electromechanical equipment.
1.Addresses the pain points of traditional analog meters, such as unclear readings, significant parallax errors, inability to upload data remotely, and lack of configurable limit alarms;
2. Embedded installation saves cabinet space, simplifies commissioning, and allows for quick on-site configuration of transformation ratios;
3. Strong interference resistance ensures stable measurements in environments surrounding factory motors and variable frequency drives;
4. Optional communication and signal transmission capabilities allow electrical signals to be integrated into automation control systems, enabling unattended power distribution monitoring;
5. Cost-effective—single-parameter monitoring offers high value for money, serving as a replacement for multifunction meters in simple circuits requiring only voltage or current measurement.

Q&A on Pain Points
Q1: Traditional analog meters suffer from parallax error, leading to inconsistent readings among different people. How is this addressed?
A1: This product features a 4-digit LED digital display with clear, fixed values. It eliminates parallax error, ensuring consistent readings across different users and reducing manual meter-reading errors.

Q2: Space in the distribution cabinet is limited, and I want to quickly install an electricity monitoring meter. Is installation complicated?
A2: It uses standard cabinet mounting cutout dimensions and a snap-in quick-mount design. No screws are required to secure the panel; simply snap it into place after cutting the cabinet opening. Installation and removal are convenient, saving time on in-cabinet installation.

Q3: The primary-side voltage and current at the site are very high. Can the meter be adapted to use current transformers and flexibly adjust the measurement range?
A3: It supports custom transformation ratios and decimal point settings, and can be connected to external voltage and current transformers to accommodate high-voltage and high-current circuits. Parameters can be modified directly using the SET button on the panel without any hardware modifications.

Q4: What should be done if electromagnetic interference from variable frequency drives and motors in the workshop causes measurement fluctuations and inaccuracies in standard meters?
A4: The meter features a built-in EMC anti-interference circuit and additional hardware input protection. Even in industrial environments with strong

electromagnetic interference, measurement values remain stable, reducing fluctuations and false alarms.

Q5: I want to feed voltage/current data into a PLC or higher-level system for remote monitoring, but standard analog meters cannot upload data. How can this be addressed?
A5: Choose the RS485 Modbus communication version or the 4–20 mA transmitter output version to upload measurement data in real time, enabling automated remote monitoring and data logging.

Q6: The equipment requires an out-of-limit power-off alert, but standard meters cannot automatically monitor for exceedances. How can this be achieved?
A6: You can select a model with upper and lower limit alarm outputs. When the measured value exceeds or falls below the set thresholds, the relay contacts activate, triggering an external audible and visual alarm or a linked control circuit.

Product Detailed Specifications

I. Basic Electrical Parameters

Product	Single-Phase Digital Ammeter	Single-Phase Digital Voltmeter
Accuracy Class	Class 0.5 (±0.5% FS)	Class 0.5 (±0.5% FS)
Measurement System	Single-phase AC / DC (selectable)	Single-phase AC / DC (selectable)
Standard Input Signal	AC: 1 A / 5 A (with external CT); DC: 0–5 A	AC: 0–500 V direct input; DC: 0–600 V
Overrange Capability	Continuous: 1.2 times rated current; Instantaneous: 10 times rated current for 5 s	Continuous: 1.2 times rated; Instantaneous: 2 times rated, 1 s
Measurement Frequency (AC Models)	45–65 Hz	45–65 Hz
Display Specifications	4-digit red LED display, 0.000–9999, with programmable decimal point	4-digit red LED display, 0.000–9999, with programmable decimal point
Data Refresh Rate	Approx. 1 update per second	Approx. 1 update per second
Expandability	Supports custom CT ratios for high-current measurements	Supports PT (voltage transformer) ratio settings for high-voltage measurements
Optional Outputs	① RS485 Modbus-RTU communication; ② 4–20 mA analog output; ③ Upper and lower limit relay alarm outputs (dry contacts, AC 220 V/3 A)	① RS485 Modbus-RTU communication; ② 4–20 mA analog output; ③ Upper and lower limit relay alarm outputs (dry contacts, AC 220 V/3 A)

II. Isolation Performance Parameters
1. Insulation Resistance: ≥100 MΩ @ 500 V DC between input, power supply, and output terminals

2. Power-Frequency Withstand Voltage: Input ↔ Auxiliary Power Supply: 2000 V AC, 50 Hz, sustained for 1 minute, with no breakdown or flashover

3. Input ↔ Enclosure: 2000 V AC, 50 Hz, sustained for 1 minute

4. Output (Communication / Transmitter / Alarm) ↔ Power Supply: AC 1000 V, 50 Hz, sustained for 1 minute

5. EMC Immunity: Complies with IEC 61000 electromagnetic compatibility standards; resistant to electrostatic discharge, surges, and burst noise; suitable for workshop environments with strong interference from variable frequency drives and motors

III. Power Supply & Power Consumption Parameters
--- Standard Power Supply Options:
-- Version 1: DC24V (Commonly used for export, 22–28 VDC)
-- Version 2: Wide-voltage AC/DC 85–265 V (Standard model for domestic cabinet installations)

--- Full-Load Power Consumption: ≤3VA (Standard base model; ≤4VA for models with communication + alarm functions)

--- Power Distribution Output (Optional): 24 VDC output, maximum load 30 mA, capable of powering external sensors

--- Power Supply Ripple Tolerance: Allows power supply ripple ≤10% without affecting measurement accuracy

IV. Environmental Adaptation Parameters

Product	Specifications
Operating Temperature	-10°C to +55°C
Storage Temperature	-25°C to +70°C
Relative Humidity	5%–93% RH, no condensation, no corrosive gases, no salt fog
Operating Altitude	≤2,500 m; custom versions available for altitudes up to 4,000 m
Panel Protection Rating	IP54 (front panel); IP30 on the terminal side of the enclosure (inside the cabinet)
Explosion-Proof Rating	Intrinsically safe, non-explosion-proof type; for explosion-proof applications, must be connected to an explosion-proof circuit via a Qidian QD series intrinsically safe barrier; intended solely for intrinsically safe explosion-proof systems
Pollution Degree	Pollution Degree 2; for indoor distribution cabinet installation only; direct outdoor use is prohibited
Mean Time Between Failures (MTBF)	≥50,000 h

V. Physical Specifications (Dimensions and Installation)
1. **Installation Method: Panel-mounted snap-in installation (includes transparent plastic clips; slide into cutouts in the cabinet to secure—no panel screws required)**

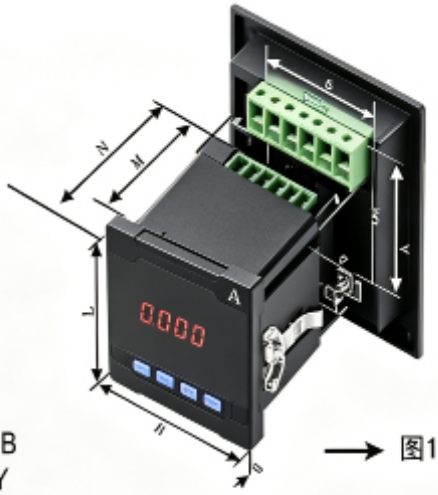
2. Dimensions (Width × Height × Depth): **96mm × 96mm × 82mm**

3. Cabinet Cutout Dimensions: **91 mm × 91 mm**; compatible with control cabinet panels up to 5 mm thick

4. Net Weight: Approximately 210 g

5. Housing Material: Flame-retardant ABS engineering plastic, UL94-V0 flame-retardant rating, matte black housing

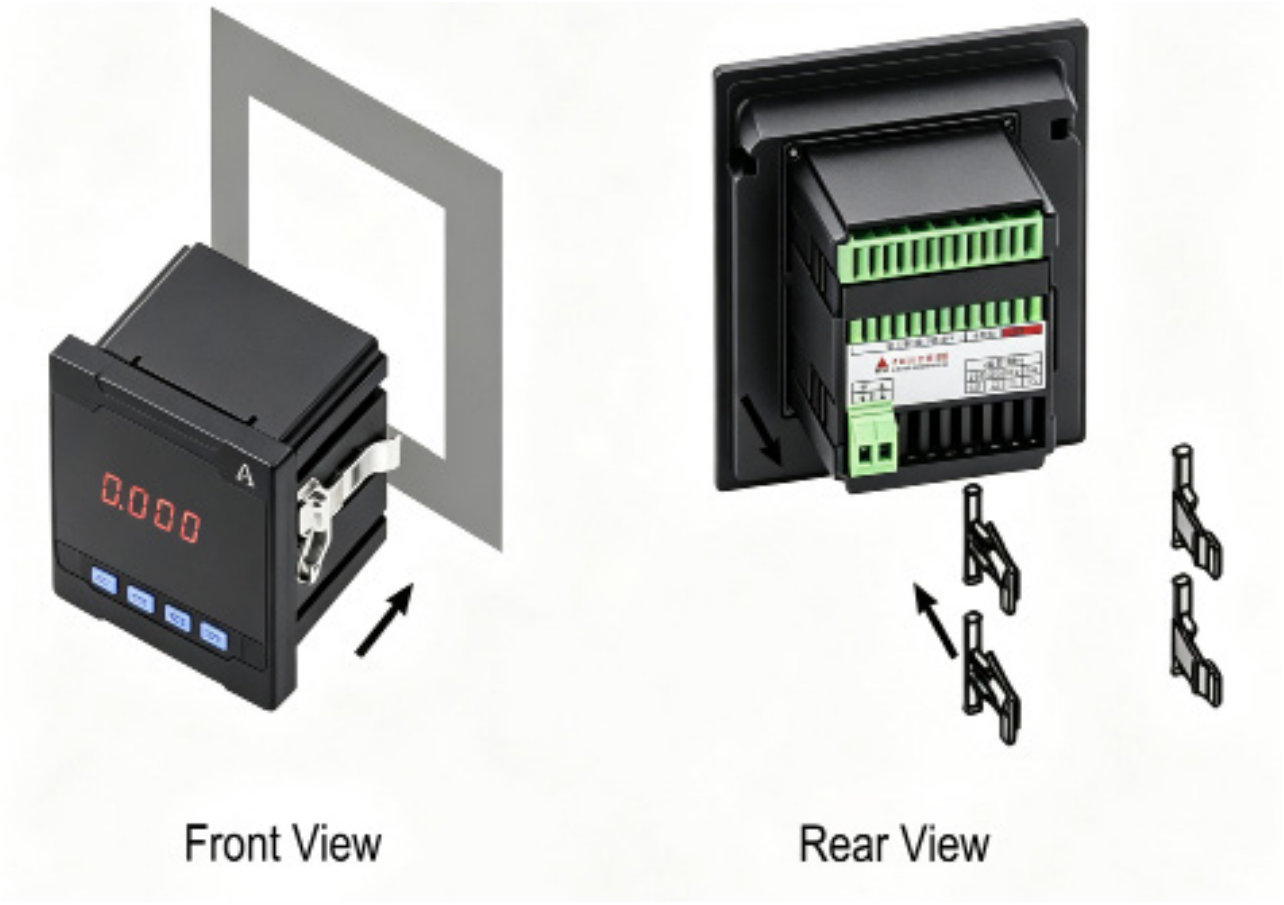
6. Panel Structure: Front panel features 4 blue operation buttons (left/right shift, SET confirmation button); V/A model designation in the upper right corner; red LED digital display window
> - Front bezel: 96mm (W) × 96mm (H)
> - Cutout: 91 × 91 mm square opening
> - Meter insertion depth into cabinet: 82 mm; rear end includes green plug-in terminal blocks
> - Snap-fit slots on both left and right sides, with 2 sets of plastic spring clips included to secure the meter to the cabinet panel



Mounting Dimensions: A x B
Cutout Dimensions: S x Y
Panel Dimensions: L x H (Unit:mm)

→ 图1

Dimensions (L x H) Unit: mm	Mounting Dimensions (A x B) Unit: mm	Cutout Dimensions (S x Y) Unit: mm	Overall Length (N)mm	Depth (M)mm
120 x 120	110 x 110	111 x 111	93	85
96 x 96	90 x 90	91 x 91	93	85
80 x 80	75 x 75	76 x 76	81	71
72 x 72	66 x 66	67 x 67	81	71



Scenario-Based Selection Guide

Key Selection Criteria

1. **Signal Type**: First, determine whether the signal to be measured is AC or DC. The AC model supports 45–65 Hz utility-frequency signals; the DC model is used for monitoring DC power supplies and battery circuits. For ammeters, confirm whether they are connected directly to low currents or require an external CT (current transformer) for high-current measurements; for voltmeters, distinguish the direct voltage measurement range—high-voltage applications require a PT (potential transformer).

2. **Number of Channels**: This series consists of **single-channel** instruments; each unit supports only one single-phase current or one single-phase voltage measurement. If both voltage and current need to be monitored simultaneously, a separate voltmeter and ammeter must be selected and installed together; a single unit cannot measure both quantities at the same time.

3. **Power Supply**: Two power supply options are available. The 24 V DC version is suitable for PLC control cabinets and automation equipment and is commonly used in international trade projects; the 85–265 V AC/DC wide-voltage version is compatible with domestic power distribution switchgear and can be directly connected to the mains circuit.

4. **Explosion-Proof Requirements**: The standard general-purpose meter is a non-explosion-proof product and must not be installed directly in hazardous areas. If used in explosion-proof environments, the meter body must be placed in a safe area, and the front-end circuit must be equipped with a Qidian QD series intrinsically safe barrier to construct an intrinsically safe monitoring system; ordinary meters must not be connected directly to explosion-proof sites.

5. **Installation Environment**: Confirm the on-site temperature, humidity, and electromagnetic interference (EMI) levels. Select the basic model for standard indoor distribution cabinets; in strong electromagnetic environments near variable frequency drives (VFDs) or motors, the enhanced EMC interference-resistant version must be selected; in high-humidity or corrosive gas environments, additional cabinet sealing protection is required—the meter itself does not support direct contact with corrosive media; for altitudes above 2,500 m, please notify us in advance to customize a high-altitude-compatible version.

6. **Additional Functionality Requirements**: Confirm whether upper and lower limit relay alarms, RS485 Modbus communication, or 4–20 mA transmitter output are required. If there is no need for remote monitoring or alarms, select the basic display model to reduce procurement costs.

Industry-Specific Selection Guidelines:

Chemical Industry: For power distribution and control cabinets in standard non-explosion-proof workshops, select the basic EMC version; for monitoring in explosion-proof zones, place the instrument in a safe area and pair it with a QD intrinsically safe barrier. Use a model equipped with RS485 communication to upload data to the DCS system for real-time monitoring of circuit voltage and current.

Power Industry: For high- and low-voltage power distribution switchgear, select the AC/DC 85–265 V wide-voltage power supply version. Connect external CT/PT transformers and optionally enable relay alarm functionality for on-site display of circuit electrical parameters in the power distribution room.

Metallurgical Industry: Workshops contain a large number of motors and variable frequency drives, resulting in strong electromagnetic interference. It is essential to select versions with enhanced EMC interference resistance. DC 24 V power supply should be prioritized to reduce interference introduced by the power source and ensure stable acquisition of current and voltage signals.

Pharmaceutical Industry: For control cabinets in cleanrooms, the basic model of the meter is sufficient. Models with RS485 communication are preferred for integration with the central SCADA system to meet the power monitoring requirements for cleanroom equipment. The meter housing is made of flame-retardant ABS material to comply with cleanroom safety requirements.

Smart Manufacturing and Automation Equipment Industry: For equipment control cabinets, DC24V-powered versions are recommended. Optional 4–20 mA transmitters or Modbus communication can be selected as needed to feed voltage and current data into the PLC, enabling equipment status monitoring and fault early warning.

Common Mistakes in Instrument Selection:
1. Ignoring the isolation rating: Failing to consider the isolation withstand voltage during selection; using low-isolation, basic models in power distribution circuits with strong interference can easily cause measurement values to fluctuate wildly, or even allow high voltage to leak into the system, damaging downstream PLCs and industrial control equipment. For high-voltage circuits, models with a 2000V isolation rating between input power sources should be selected.

2. Incorrect Signal Range Selection: In high-current applications, directly using a direct-connection ammeter without a matching current transformer; or directly connecting a voltmeter to a high-voltage circuit without a voltage transformer—both can cause the instrument's input to overload and burn out. Selection must be matched to the primary circuit, and CT/PT transformation ratios must be configured correctly.

3. Neglecting load matching: When selecting a 4–20 mA transmitter output function, the load resistance of the downstream data acquisition equipment is not calculated, exceeding the instrument's maximum load range and resulting in analog signal distortion and inaccurate measurement data.

4. Incorrect selection of general-purpose models for explosion-proof environments: Installing standard, non-explosion-proof instruments directly in hazardous areas violates explosion-proof regulations and poses safety hazards; instruments for explosion-proof environments must be placed in safe areas, and intrinsically safe barriers must be installed in the circuit.

5. Misconceptions Regarding Channels: The mistaken belief that a single meter can simultaneously measure current and voltage. The single-phase meters in this series are single-parameter instruments; each unit can monitor only one electrical quantity, so separate models must be selected.

Customization Recommendations
1. Customization for Special Signals: For non-standard AC frequency signals or non-standard DC input signals, we can customize the instrument's internal sampling program to modify the measurement range and the number of decimal places, thereby adapting to non-standard measured signals.

2. Customization for Non-Standard Operating Conditions: For high-altitude (2500 m), low-temperature (below -10°C), and high-salt-fog environments, we can adjust component selection to enhance the meter's environmental resistance and modify the enclosure's corrosion protection scheme.

3. Panel Appearance Customization: We can customize panel silk-screen markings, modify the V/A labels and brand logos on the panel to meet customers' private-label requirements; we can also adjust the brightness of the LED display to suit cabinet environments with low or high ambient light.

4. Output Function Customization: Output functions can be added, removed, or combined as needed. For example, alarms can be disabled to retain only RS485 communication, or relay activation logic and upper/lower limit hysteresis parameters can be customized.

5. Wiring and Software Customization: Default parameters for communication protocol addresses and transmitter output ranges can be customized. CT/PT transformation ratios are preset at the factory, eliminating the need for on-site debugging—the instrument is ready to use right out of the box.

Installation and Commissioning Specifications

Pre-Installation Preparation
Check the Accessories:
1. Unpack and inventory the contents: 1 single-phase digital display meter, 2 sets of plastic snap-fit clips, and 1 user manual; optional versions include terminal blocks. Verify the meter model, power supply specifications, measurement input signals, and optional features (communication / transmission / alarm) to ensure the model matches the purchase order. Inspect the housing for any dents or damage and check the terminals for deformation.

2. Environmental Inspection
Ensure the ambient temperature at the installation location is between -10°C and +55°C. The environment must be free of persistent condensation, strong corrosive gases, and excessive dust. Keep the meter away from sources of strong electromagnetic radiation, such as high-power variable frequency drives, contactors, and motors. If the altitude exceeds 2,500 m, verify that the meter is a high-altitude customized version. Do not install the meter directly outdoors without protection.

3. Tool List
Small Phillips-head screwdriver, wire strippers, multimeter, electrical tape, marker pen; if calibration is required, prepare a signal source separately; for shielded cables, it is recommended to use two-core shielded cable.

4. Safety Precautions
All wiring work must be performed with the power disconnected, strictly adhering to on-site electrical safety regulations; wear insulated protective gear when wiring high-voltage circuits; before wiring, confirm that the circuit under test is de-energized and has been tested for voltage, and post a "Do Not Close" warning sign; for high-voltage/high-current circuits, the secondary side of current transformers (CT circuits) must never be left open to prevent high-voltage injuries.

Standard Installation Procedure

1. This instrument is designed for snap-in panel mounting, not DIN rail mounting.

2. Cut a 91 mm × 91 mm opening in the cabinet panel, remove any burrs from the edges of the opening, and ensure the panel thickness is between 1 and 5 mm;

Push the instrument into the cutout from the front of the cabinet. From the rear of the cabinet, snap the two sets of plastic clips into the slots on either side of the instrument, then lock the clips in place so that the front of the instrument lies flush against the control cabinet panel;

3. Wiring Specifications (Terminal Definitions)

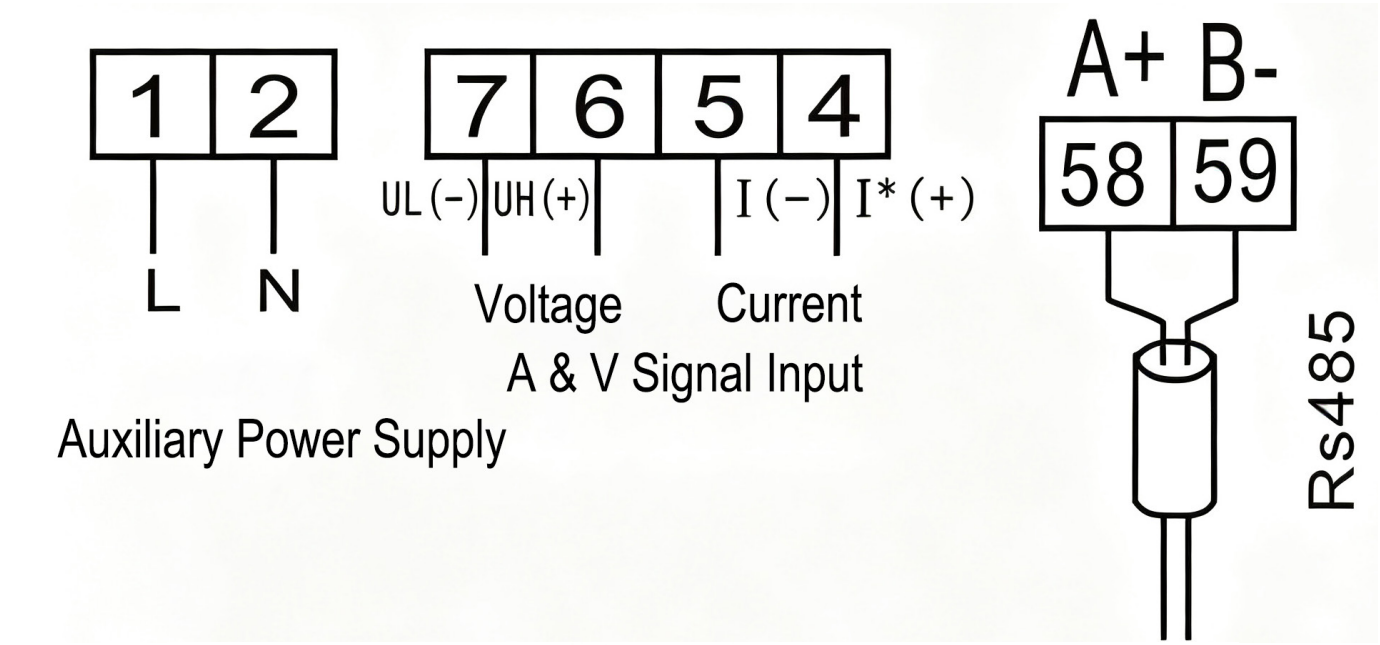
Power terminals: The DC 24 V version distinguishes between positive and negative terminals; the AC/DC 85–265 V wide-voltage power supply does not distinguish between positive and negative;

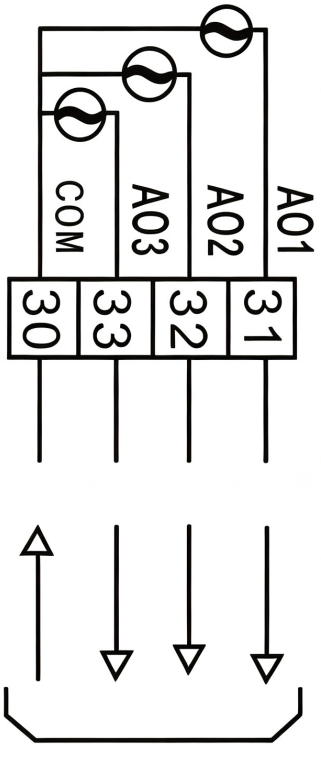
Input Signal Terminals: Connect the voltmeter to the single-phase voltage being measured; connect the ammeter to the secondary side of the current transformer (CT);

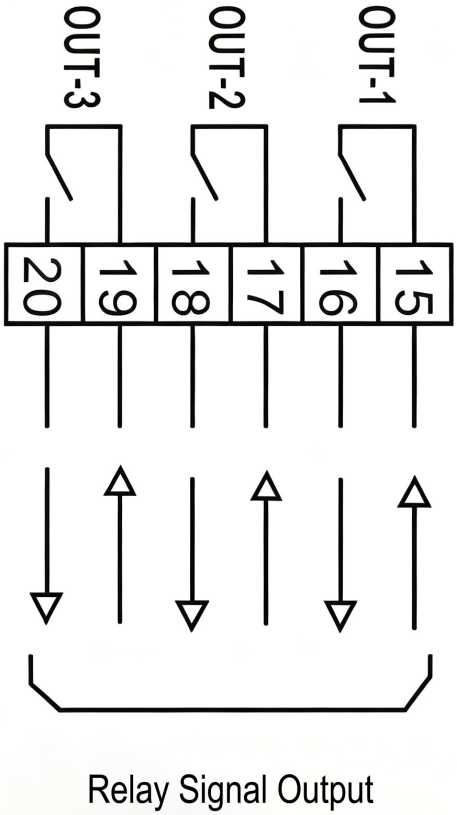
Output Terminals: RS485 communication terminals A/B, 4–20 mA transmitter terminals, and dry contact terminals for upper and lower limit relay alarms;

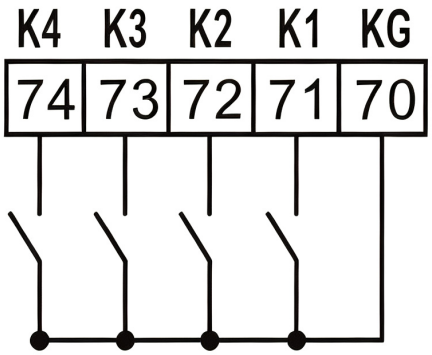
4. Grounding Requirements

The instrument housing's grounding terminal must be connected separately to the protective earth (PE). Use a multi-strand copper wire with a cross-sectional area of ≥1.0 mm² for the grounding wire. The shielding layer of shielded cables must be grounded at one end only—specifically on the instrument side—while the far end must remain floating (ungrounded) to prevent ground loops from introducing interference. The grounding busbar inside the power distribution cabinet must be reliably grounded, with a grounding resistance of ≤4 Ω.

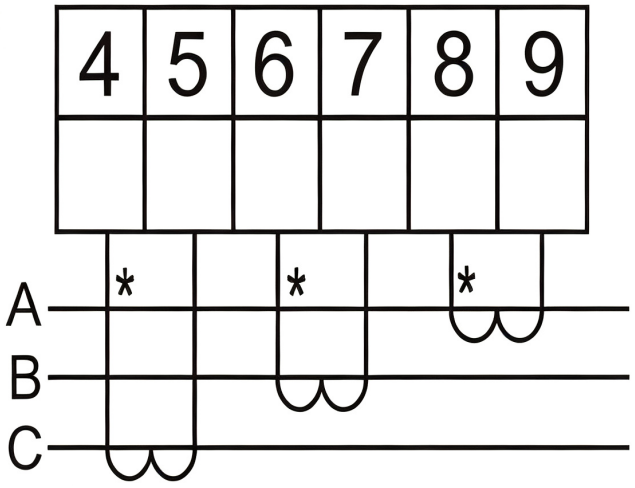




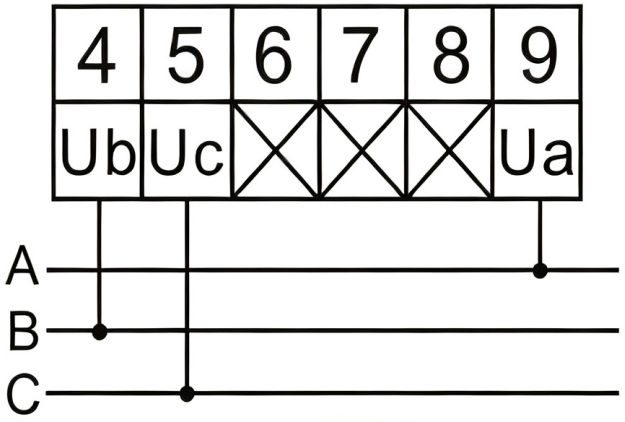




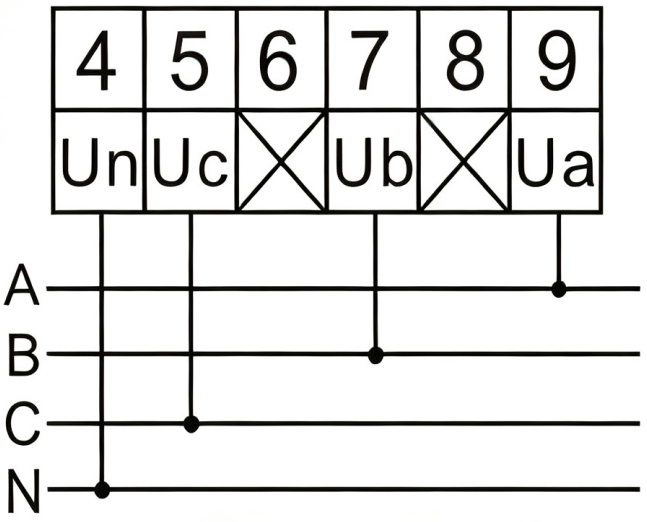
Relay Signal Input



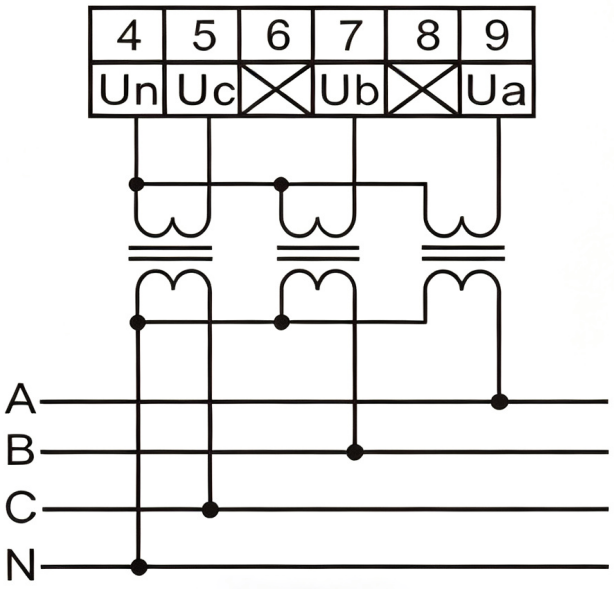
3-Phase Current



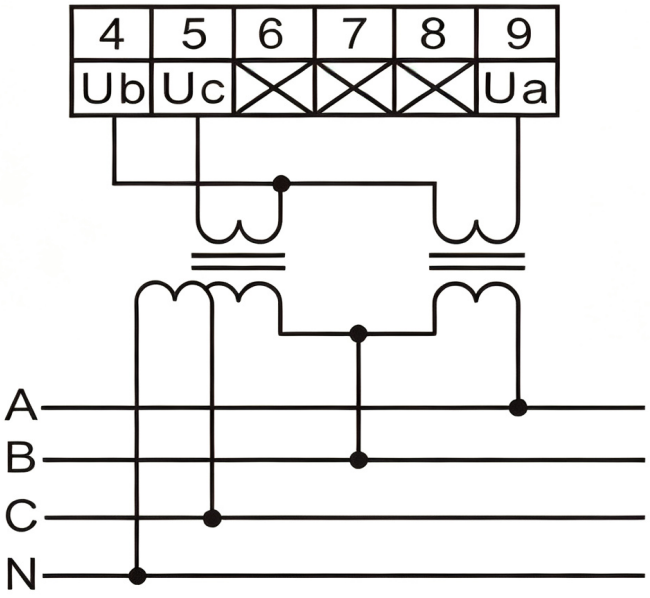
3 Phase 3 Wire



3 Phase 4 Wire



High Voltage 3 Phase 4 Wire



High Voltage 3 Phase 3 Wire

Note: If the terminal numbers in the wiring diagram differ from those on the actual product's rear panel, please refer to the actual wiring diagram on the product's rear panel.

Recommendations for Daily Use & Operations and Maintenance

Key Points for Daily Inspections

1. **Visual and Display Inspection**: Inspect the instrument housing daily or during shift rounds to ensure there are no cracks, deformations, or burn marks; check the 4-digit red LED display to ensure the digits are complete with no missing segments, no persistent flickering, and no garbled characters; verify that the keypad is intact and shows no signs of water ingress or condensation.

2. **Signal Stability Monitoring**: Continuously monitor measurement readings; under normal operating conditions, values should remain stable with only slight fluctuations. If erratic, significant jumps or value drift occur, investigate grounding, cable interference, or the condition of the current transformers (CTs). For models with communication capabilities, simultaneously verify that data received by the host computer is continuous and free of packet loss. For ammeters, pay close attention to the CT circuits to ensure there are no open-circuit alarms; for voltmeters, check that there are no short-circuit abnormalities in the input.

3. **Temperature and Humidity Monitoring**: Monitor the temperature inside the cabinet surrounding the instruments to ensure it remains within the operating range of -10°C to +55°C; check the humidity inside the cabinet to prevent condensation; in high-humidity environments, pay special attention to the operational status of the cabinet's dehumidification system.

4. **Functionality and Contact Inspection (Optional Versions)**: For models with upper and lower limit alarms, periodically verify the trigger logic for out-of-limit alarms;
for 4–20 mA transmitter models, periodically compare the values collected by the PLC with the instrument's local display; for RS485 communication models, check the status of communication transmission and reception.

5. **Environmental and Abnormal Noise/Odor Inspection**: Check the area around the instrument for any burning smell or abnormal heat; ensure the instrument is located away from high-power variable-frequency drives and contactors, that there is no significant dust accumulation inside the cabinet, and that no corrosive gases have entered.

Regular Maintenance Schedule
1. **Cleaning Frequency**: In standard indoor power distribution environments, **clean once every 6 months after powering down**; In metallurgical or highly dusty workshops, shorten the interval to 3 months. Use only a dry, lint-free soft cloth to wipe the panel and housing; use low-pressure dry compressed air to blow out the gaps between buttons. Do not use organic solvents such as alcohol or acetone to wipe the ABS housing or digital display, as this may corrode the panel coating. Do not allow liquids to come into contact with the instrument terminals.

2. **Wiring Tightness Inspection**: Every six months, turn off the power and inspect all terminal blocks; tighten the wiring for power, input signals, communication, and alarm circuits; check the terminals for signs of oxidation, discoloration, or overheating; pay special attention to the secondary wiring of current transformer (CT) terminals to prevent high voltage caused by loose connections or open circuits; also inspect shielded cable joints and PE protective ground wires to ensure reliable grounding.

3. **Cable Aging Inspection**: Simultaneously inspect the insulation of signal cables for cracking or damage, and check the shielding for breaks; in high-interference environments, pay special attention to the integrity of the twisted-pair shielding.

4. **Recommendations for Accuracy Recalibration**: For standard Class 0.5 instruments, **accuracy calibration should be performed once every 12 months** under normal operating conditions; for critical monitoring points in the chemical and power industries, recalibration is recommended every 6 months. Perform comparison calibration using a standard signal source with a higher accuracy class than the instrument; record data after recalibration and maintain an instrument log; if the error exceeds 0.5% FS, perform internal calibration of the instrument.

5. **Complete Instrument Self-Test**: After power-up following maintenance, run the self-test program in the instrument menu to verify all functions, including the digital display, button operation, alarm output, and communication transmission.

Long-Term Maintenance Tips

1. **Dust Prevention**: Keep the control cabinet doors closed to minimize dust ingress; in high-dust environments, install dust-proof sealing strips on the cabinet. For instruments stored for extended periods, place them in dry, dust-proof packaging and power them on for 4 hours every 3 months to dispel moisture from the circuit boards and prevent component deterioration due to moisture.

2. **Moisture and Condensation Protection**: In high-humidity environments or during the rainy season, install dehumidifiers and heaters in power distribution cabinets to regulate internal humidity; in environments with corrosive gases, implement gas isolation measures for the cabinet; prevent condensation in instrument terminal areas caused by temperature fluctuations; for equipment that has been out of service for an extended period, perform a 15-minute no-load warm-up before reconnecting measurement signals.

3. **Long-Term Optimization for Interference Resistance**: Route signal cables and power cables in separate cable trays; do not run them in parallel through the same conduit over long distances. Maintain **single-ended grounding** for shielded twisted-pair signal cables; do not ground both ends to prevent ground loops. Near high-interference equipment such as variable frequency drives, minimize the length of signal cables as much as possible; if necessary, install power line filters upstream of the instrument power supply. Periodically retest the ground resistance of the grounding busbar to ensure it is ≤4Ω.

4. **Protection Against Extreme Environments**: For high-altitude (□2500m) custom versions, conduct annual low-voltage and withstand voltage retests; in low-temperature environments, ensure the cabinet interior is insulated; for salt fog and coastal conditions, prioritize custom versions with circuit boards coated with three-proof varnish, and inspect the PCB's corrosion resistance annually.

5. **Operational Protection**: Do not press the blue function buttons on the panel with sharp or hard objects to prevent button damage; all internal maintenance and wiring operations must be performed with the power disconnected; prolonged overloading of instrument inputs accelerates component aging; whenever possible, allow a 1.2-fold margin of safety in the measurement range.

Troubleshooting & Emergency Response

List of Common Faults + Cause Analysis + Step-by-Step Troubleshooting

Fault 1: No Display on Meter After Power-On (LED Display Does Not Light Up)
--- Symptom: After turning on the power, the red LED display does not light up at all, and the buttons do not respond.
--- Cause Analysis
1. Power supply circuit break or loose terminals; reversed polarity on the DC24V version; power supply voltage below the meter's minimum operating voltage
2. Overvoltage in the power supply; blown fuse in the power supply circuit; burned-out power supply chip
3. Water ingress or condensation at the meter terminals causing a power supply short circuit and damage
--- Step-by-Step Troubleshooting
1. Turn off the power. Use a multimeter to measure the voltage at the meter's power supply terminals and verify that the power supply specifications match (DC 24V / AC/DC 85–265V).
2. Check whether the power supply terminals are loose; for the DC 24V model, swap the positive and negative terminals and try again.
3. If the voltage is normal but there is still no display, determine that the meter's hardware is damaged.
--- Emergency Workaround: Temporarily replace the instrument with a spare unit of the same model to quickly restore circuit monitoring.

Fault 2: Measurement Signal Drift—Persistently Inaccurate Readings and Slow Value Shift
--- Symptoms: Instrument readings do not match the actual circuit electrical parameters; values change gradually and remain unstable under static operating conditions
--- Cause Analysis
1. Incorrect CT/PT transformation ratio settings; incorrect decimal point configuration
2. Oxidation or loose connections at terminal blocks; unstable contact resistance in the signal circuit
3. Drastic changes in ambient temperature and humidity, or the meter has not been calibrated for an extended period
4. Aging current/voltage transformers causing drift in the output signal itself
--- Step-by-Step Troubleshooting
1. Enter the instrument's SET menu, verify the CT/PT transformation ratio and range parameters, and resave the settings;
2. Power down the instrument, tighten all signal terminals, and clean any oxidation or corrosion from the terminals;
3. Perform a comparison verification using a standard signal source and carry out instrument accuracy calibration;
4. If drift persists after calibration, inspect the front-end current transformers for faults.
--- Emergency Workaround: Temporarily use a portable multimeter to take manual readings on-site while simultaneously replacing the current transformer or instrument.

Fault 3: Fluctuating Readings, Erratic Values (Interference Distortion)
--- Symptoms: The instrument's digital display fluctuates significantly and erratically, while the actual measured quantity remains stable
--- Analysis of Causes
1. Power cables and signal cables are routed in parallel within the same cable tray, causing electromagnetic interference from inverters and contactors
2. Shielded cables are grounded at both ends, creating a ground loop; the grounding resistance of the protective ground wire exceeds the specified limit
3. Signal cables are damaged, resulting in hidden leakage current
--- Step-by-Step Troubleshooting
1. Inspect the wiring; route signal cables and power cables separately, minimize the length of parallel runs, and route them perpendicular to each other at crossing points;
2. Modify the shielded cables: retain only a single-point ground connection on the meter side, leaving the shield at the far end floating; re-measure the ground resistance to ensure it is ≤4Ω;
3. Add ferrite cores to the signal lines, or install a power filter at the power supply input;
4. Check the cable jacket for damage.
--- Emergency Workaround: Temporarily shorten the signal cable length, disconnect the RS485 / transmitter output, and prioritize ensuring the stability of the local display.

Fault 4: Alarm Abnormality (Unjustified Alarm Triggering / No Alarm When Limits Are Exceeded)
--- Symptoms: The instrument's alarm relay activates even though operating conditions are normal; or the instrument fails to trigger an alarm when actual values exceed the threshold.
--- Analysis of Causes
1. Upper and lower limit thresholds or hysteresis parameters are set incorrectly
2. Alarm relay contacts are worn out, wiring is loose; external load is short-circuited
3. Abnormal measurement signal causes the instrument to incorrectly detect an out-of-limit condition
--- Step-by-Step Troubleshooting
1. Enter the instrument menu, verify the upper limit, lower limit, and alarm hysteresis parameters, then reset and save them;
2. Power down the instrument and inspect the wiring of the alarm output terminals; check the wiring of the external audible and visual alarms;
3. Manually input a standard out-of-limit signal to test the relay operation and verify the alarm function.
--- Emergency Workaround: Temporarily disconnect the alarm circuit and rely on manual patrols for monitoring; restore the interlock once the fault is repaired.

Fault 5: Output Abnormality (No RS485 Communication / No 4–20 mA Transmitter Output)
---Symptoms: The instrument's local display is normal, but the host PLC cannot read data; there is no 4–20 mA analog signal output, and the value remains fixed
---Cause Analysis
RS485: A and B wires are reversed; communication address and baud rate settings do not match; bus terminating resistors are not configured as required;
4–20 mA Transmitter: The downstream load resistance exceeds the instrument's maximum allowable load; open circuit in the output loop;
Hardware failure in the instrument's output module
---Step-by-Step Troubleshooting
RS485: Swap the A/B signal wires; verify the communication address, baud rate, and parity bit; add terminating resistors at both ends of the bus;
4–20 mA: Calculate the downstream load resistance; reduce the load to within the instrument's permissible range; check the circuit wiring;
Isolate the output line for testing to determine whether the fault lies with the wiring or the instrument itself.
Emergency Workaround: Temporarily suspend remote data acquisition and rely on the instrument's local LED display for on-site monitoring.

Fault 6: Missing Segments on the Seven-Segment Display, Abnormal Indicator Lights
---Symptoms: Missing strokes in some digits on the seven-segment display, garbled characters displayed continuously, or persistent flashing upon power-up
---Cause Analysis
Failure of the instrument's internal display driver circuit
Abnormal internal MCU program caused by severe lightning strikes or surge impacts
Panel buttons are stuck, continuously triggering button inputs
---Step-by-Step Troubleshooting
Power off and let the instrument sit for 5 minutes, then power on to reset;
Check if the 4 blue buttons are stuck and remove any foreign objects from the button gaps;
If segments are still missing or garbled text persists after resetting, determine that the instrument's hardware is damaged.
---Emergency Workaround: Directly replace with a spare meter.

After-Sales Repair Guidelines
Fault Determination Criteria
If, after completing all the troubleshooting steps above, it is confirmed that the external power supply, wiring, cables, current transformers, and host system are all functioning normally, but the meter still fails to operate properly, the issue is deemed a fault with the meter itself, and a repair request may be submitted. Damage caused by human error (such as burnout due to overpressure, corrosion from water ingress, physical damage from impact, or unauthorized opening of the casing for modification) is not covered by the free warranty.

Warranty Coverage
A 24-month warranty is provided from the date of manufacture. During the warranty period, hardware failures resulting from non-human causes will be repaired or replaced free of charge;
The following situations are not covered by the warranty:
Burnout caused by input overpressure, overload, or a CT secondary circuit open;
Water ingress, condensation, corrosion, or damage from external forces;
Unauthorized disassembly, hardware modifications, or unauthorized firmware modifications by the user;
Damage caused by force majeure, such as lightning strikes or natural disasters.

Repair Process
① Record the instrument model, serial number, on-site fault symptoms, and photos of the operating environment;
② Contact technical support, provide product information and the purchase contract number, and describe the fault;
③ A technical engineer will provide remote assistance for online troubleshooting; if the issue cannot be resolved remotely, return the unit for inspection and repair according to the instructions;
④ After repair is completed and the unit passes inspection, it will be returned to the customer.