VOLTCRAFT

PA Series Digital Power Meter
Quick Guide

■ **PA-3000**

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1. General Safety Requirement

Before any operations, please read the following safety precautions to avoid any possible bodily injury and prevent this product or any other products connected from damage. In order to avoid any contingent danger, this product is only used within the range specified.

Only the qualified technicians can implement the maintenance.

To avoid Fire or Personal Injury:

- **Use Proper Power Cord.** Use only the power cord supplied with the product and certified to use in your country.
- **Product Grounded.** This instrument is grounded through the power cord grounding conductor. To avoid electric shock, the grounding conductor must be grounded. The product must be grounded properly before any connection with its input or output terminal.
- **Limit operation to the specified measurement category, voltage, or amperage ratings.**
- **Check all Terminal Ratings.** To avoid fire or shock hazard, check all ratings and markers on the instrument. Refer to the user's manual for more information about ratings before connecting the instrument. Do not exceed any of ratings defined in the following section.
- **Do not operate without covers**. Do not operate the instrument with covers or panels removed.
- **Use Proper Fuse.** Use only the specified type and rating fuse for this instrument.
- **Avoid exposed circuit**. Do not touch exposed junctions and components when the instrument is powered.
- **Do not operate if in any doubt.** If you suspect damage occurs to the instrument, have it inspected by qualified service personnel before further operations.
- **Use your instrument in a well-ventilated area.** Inadequate ventilation may cause an increasing of temperature or damages to the instrument. Please keep the instrument well ventilated, and inspect the air outlet and the fan regularly.
- **Do not operate in wet conditions.** To avoid short circuit inside the instrument or electric shock, never operate the instrument in a humid environment.
- **Do not operate in an explosive atmosphere.**In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.
- **Keep instrument surfaces clean and dry.** To avoid the influence of dust or moisture in air, please keep the surface of device clean and dry.

2. Safety Terms and Symbols

Safety Terms

Terms in this Manual. The following terms may appear in this manual:

Warning: Warning indicates the conditions or practices that could result in injury or loss of life.

Caution: Caution indicates the conditions or practices that could result in damage to this product or other property.

Terms on the Product. The following terms may appear on this product:

Danger: It indicates an injury or hazard may immediately happen.

Warning: It indicates an injury or hazard may be accessible potentially.

Caution: It indicates a potential damage to the instrument or other property might occur.

Safety Symbols

Symbols on the Product. The following symbol may appear on the product:

	Hazardous Voltage		Refer to Manual
	Protective Earth Terminal		Chassis Ground
	Public Ground		

3. Quick Start

3.1 Product Overview

The power meter adopts a dual-channel design. The rear panel (CH1) serves as the AC main input, AC supporting a maximum AC voltage and current of 600V/20ARMS. The front panel (CH2) supports both AC and DC sampling without harmonic analysis capability, optimized for DC sampling applications, and extends the DC input range up to 1000V/20A. With the dual-channel design, users can easily measure and calculate parameters such as voltage, current, power, frequency, crest factor, harmonics, integration, and efficiency.

Power Meter comes standard with RS232 communication interfaces, enabling remote control of the meter, and also features a USB host interface for saving measurement parameters directly to external storage devices, supporting long-term data recording. It offers 0.5% accuracy for voltage, current, and power measurements and includes extensive active power integration and energy accumulation functions. The power meter is widely used in testing household appliances, UPS systems, photovoltaic and wind power, charging stations, and energy storage applications.

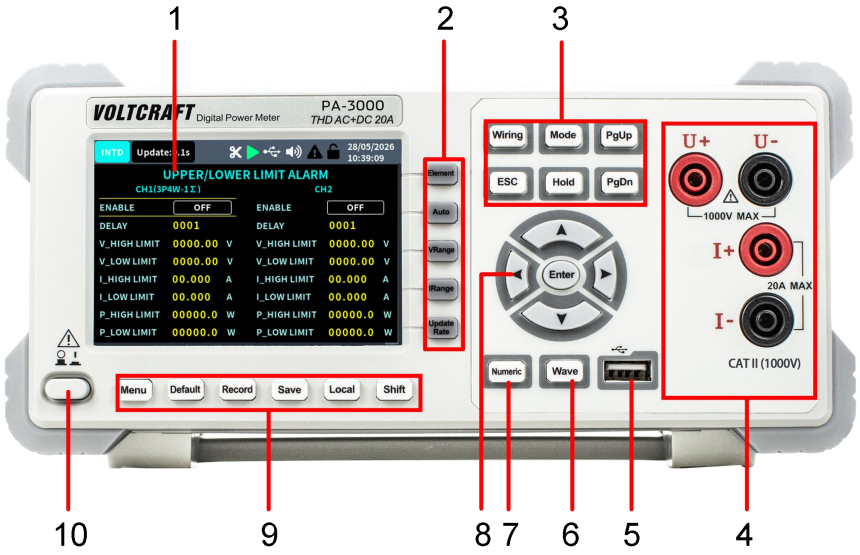
Key Features:

1. Dual-channel design (front/rear panels), AC supports single-phase/three-phase (CH1: A/B/C) measurements:
   1) Rear panel CH1 supports AC input, 3–600V/20A RMS, accuracy as high as ±0.2%.
   2) Front panel CH2 supports up to 0–1000V/0–20A AC+DC input, with ±0.5% accuracy.
2. High-resolution 3.95-inch TFT color screen display
3. Simultaneous measurement of voltage, current, power, efficiency, and harmonics.
4. Integration and harmonic analysis up to the 63rd order.
5. Manual/auto range setting.
6. Customizable efficiency calculation support.
7. Multiple display modes: numeric, waveform, and bar graph.
8. USB support for screenshots and long-term data recording.

9. Standard digital communication interfaces RS232, supporting SCPI commands and Modbus protocol.

3.2 Panel Introduction

3.2.1 Front panel

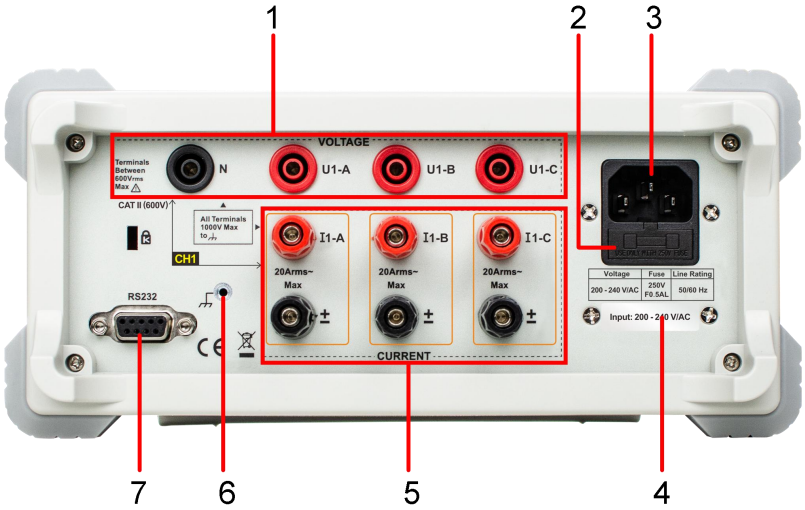


The components of the front panel are defined as follows:

1	**Display Screen**	TFT color screen displays.
2	**Menu select area**	**Element:** Channel switch key. **Auto:** Automatic range setting. **VRange:** Voltage range setting. **Irange:** Current range setting. **Update Rate:** Data update cycle.
3	**Function key area 1**	**Wiring:** Wiring and efficiency settings. **Mode:** Working mode settings. **PgUp:** Page up to previous page. **ESC:** Exit editing mode and return to the previous page. **Hold:** Page hold key or pause. **PgDn:** Page down to next page.
4	**CH2 connection area**	**CH2 voltage terminal:** Connect CH2 to the voltage to be measured. **CH2 current terminal:** Connect CH2 to the measured current.
5	**USB interface**	USB data interface.

6	**Wave key**	Waveform display page switch key.
7	**Numeric key**	Digital display page switch key.
8	**Direction key, Enter key**	↑ ↓ ← →**:** Move the cursor up, down, left, and right. **Enter:** Confirm parameter key.
9	**Function key area 2**	**Menu:** Enter Menu. **Default:** Return to the default value display page. **Record:** Data recording with USB disk for a long time (effective when U disk is inserted). **Save:** Save waveform screenshots to USB disk. **Local:** Remote communication connection or short press Local to realize keyboard lock function; long press “Local” key to unlock the panel. **Shift:** Reuse function.
10	**Power button**	ON/OFF Switch.

3.2.2 Rear Panel



The components of the rear panel are defined as follows：

1	**CH1 voltage terminal**	The red V and black ± are the CH1 voltage sampling terminals, and the three-phase voltage terminals are in a common N structure.
2	**Fuse**	Power supply fuse.
3	**AC power terminal**	The power cord inputs AC power from this connection terminal to the input terminal.
4	**AC**	AC input range.
5	**CH1 current**	The red I and black ± are the CH1 current

	terminal	terminals, and the red V and red I are the in-phase terminals.
6	**Ground**	Protective grounding.
7	**RS232 interface**	The computer can be connected via the RS232 port.

3.3 General Inspection

When you get a new digital power meter, it is recommended that you check the instrument according to the following steps.

1. Inspect the instrument for damage caused by shipping.

If the packaging carton or foam padding is severely damaged, please retain it until the instrument and accessories have passed electrical and mechanical tests.

2. Inspect the accessories.

A detailed list of supplied accessories is provided in "Appendix A: Accessories" of this manual. Refer to this information to check for missing accessories. If any accessories are missing or damaged, please contact your authorized distributor or local office.

3. Inspect the instrument.

If the instrument is damaged, malfunctions, or fails performance testing, please contact your authorized distributor or local office. If the instrument is damaged during shipping, please retain the packaging. Notify the shipping department and your authorized distributor. We will arrange for a repair or replacement.

3.4 Power-on inspection

Before operating the power meter, please ensure you understand the general safety precautions.

1. Before turning on the power, make sure the power supply voltage matches the supply voltage; otherwise, the instrument may be damaged.

2. Please make sure that the main power plug is connected to a power socket with protective grounding. Do not use a power strip without protective grounding. Before operating the instrument, you should first ensure that the instrument is well grounded.
3. Please pay attention to the positive and negative pole markings and the maximum voltage and current limits before connecting the instrument, otherwise the instrument will be burned.

Press the power button on the front panel. The startup screen will appear.

Select **Menu** to enter the system settings interface. Press the **System** Information button to access the system information interface, which displays information such as the product model, serial number, and software version number.

3.5 Connection circuit

The power meters can measure voltage, current, power, and other energy factors for various electrical products. This section describes typical circuit connection methods for practical applications of power meters.

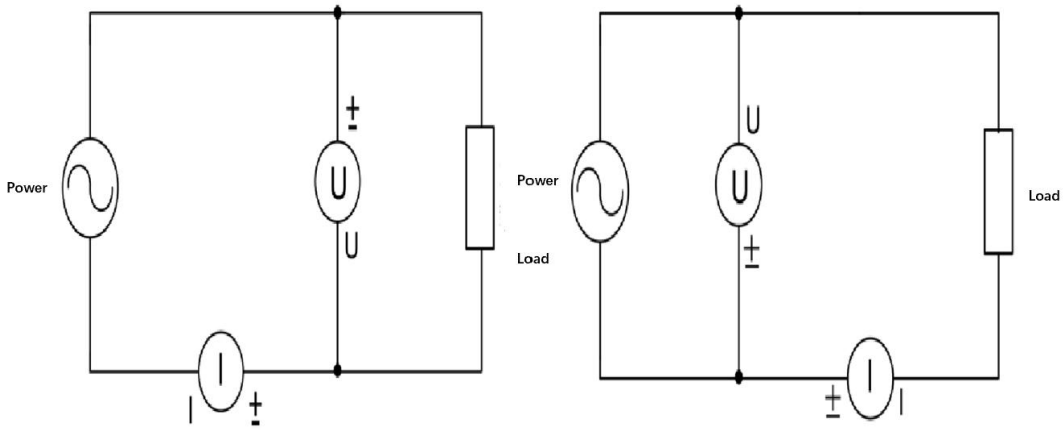
3.5.1 Precautions before connection

1. When connecting a measurement circuit, always disconnect the power supply to the circuit to avoid the risk of electric shock during connection.
2. Always connect the main power plug to a power outlet with a protective ground. Do not use a terminal block without a protective ground. Before connecting the circuit, ensure that the electronic load is properly grounded.
3. Never connect a current circuit to a voltage input terminal, or vice versa.
4. When insulating the measurement cable, ensure that the bare wires connected to the input terminal do not protrude from the terminal. Also, secure the screws of the input terminal to prevent the cable from becoming detached.
5. When connecting to the voltage input terminal, use a measurement cable with a safety rubber plug that does not expose bare wires. Ensure that the input terminal is securely fastened to prevent the cable from becoming detached.
6. Use a measurement cable that meets the rated voltage and current requirements and has a high voltage resistance and sufficient current capacity for the voltage and current being measured. When measuring a

20A current, use a copper wire with a cross-sectional area greater than 4mm^2.

3.5.2 Connection Method

To achieve accurate measurements, consider the following when connecting the voltage and current input terminals. When measuring larger currents, connect the voltage input terminals closer to the load. When measuring smaller currents, connect the current input terminals closer to the load. The circuit diagram is shown below.



Measuring larger currents **Measuring small currents**

Voltage Input Terminals

The voltage terminals are safety rubber sockets. Insert the safety plug (without exposed wires) into the voltage input terminals.

Current Input Terminals

The current input terminals are binding posts. First, wrap the wire around the screw or insert the crimp terminal through the screw shaft, then hold the terminal knob and tighten the screw.

4. Troubleshooting

If the instrument remains black with no display after pressing the power switch, please proceed as follows:

1. Check whether the power connector is properly connected.
2. Check whether the fuse below the power input socket is correctly selected and intact (use a flat-head screwdriver to open if necessary).
3. After completing the above checks, restart the instrument.
4. If the problem persists, please contact our company for service assistance.

5. Appendix

5.1 Appendix A: Accessories

- Power Cord
- Banana plug to crocodile clip test leads
- EN Manual
- DE Manual
- Safety Hintsheet

5.2 Appendix B: Maintenance and Cleaning

General Maintenance
Do not store or place the instrument in locations where the LCD display is exposed to direct sunlight for extended periods.
Caution: Do not allow sprays, liquids, or solvents to come into contact with the instrument to avoid damage.

Cleaning
Inspect the instrument regularly depending on usage. Clean the exterior of the instrument following the steps below:

1. **Wipe off surface dust with a soft cloth. When cleaning the LCD** display, take care not to scratch the transparent LCD protective cover.
2. Wipe the instrument with a damp but not dripping soft cloth. Ensure the power is disconnected before cleaning. Mild detergent or clean water may be used. Do not use any abrasive chemical cleaners, which may damage the instrument

Warning:

Before reconnecting power and operating the instrument, make sure it is completely dry to prevent electrical short circuits or personal injury caused by residual moisture.