OWH9822 Digital Power Meter

Quick Guide

For product support, visit:www.owon.com.hk/download

※: The illustrations, interface, icons and characters in the user manual may be slightly different from the actual product. Please refer to the actual product.

General Warranty

We warrant that the product will be free from defects in materials and workmanship for a period of 2 years from the date of purchase of the product by the original purchaser from our company. The warranty period for accessories such as probes, battery is 12 months. This warranty only applies to the original purchaser and is not transferable to a third party.

If the product proves defective during the warranty period, we will either repair the defective product without charge for parts and labour, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by our company for warranty work may be new or reconditioned like new. All replaced parts, modules and products become the property of our company.

In order to obtain service under this warranty, the customer must notify our company of the defect before the expiration of the warranty period. Customer shall be responsible for packaging and shipping the defective product to the designated service centre, a copy of the customers proof of purchase is also required.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. We shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than our company representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of not our supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

Please contact the nearest Sales and Service Offices for services.

Excepting the after-sales services provided in this summary or the applicable warranty statements, we will not offer any guarantee for maintenance definitely declared or hinted, including but not limited to the implied guarantee for marketability and special-purpose acceptability. We should not take any responsibilities for any indirect, special or consequent damages.

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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 600VAC/25kArms/75kApk. 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 voltage and 25kArms/75kApk current. 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.

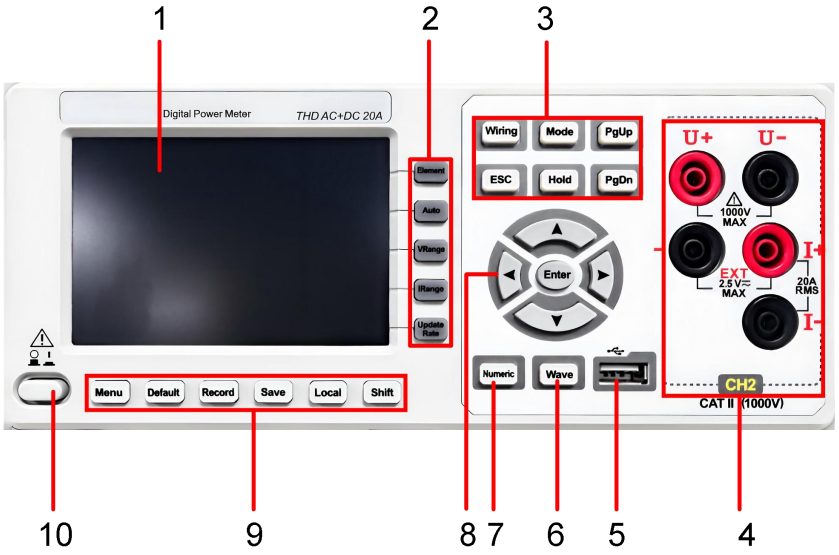
Key Features:

1. Dual-channel design (front & rear panels), supports external current sensors, suitable for high-power applications:
   1) Rear-panel CH1 channel supports AC input: 3–600 VAC / 20 A RMS (built-in) / 0–25 kA (external), with accuracy up to ±0.5%.
   2) Front-panel CH2 (AC/DC input) channel supports up to 0–1000 V / 0–20 A (built-in) / 0–25 kA (external), with accuracy up to ±0.5%.
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

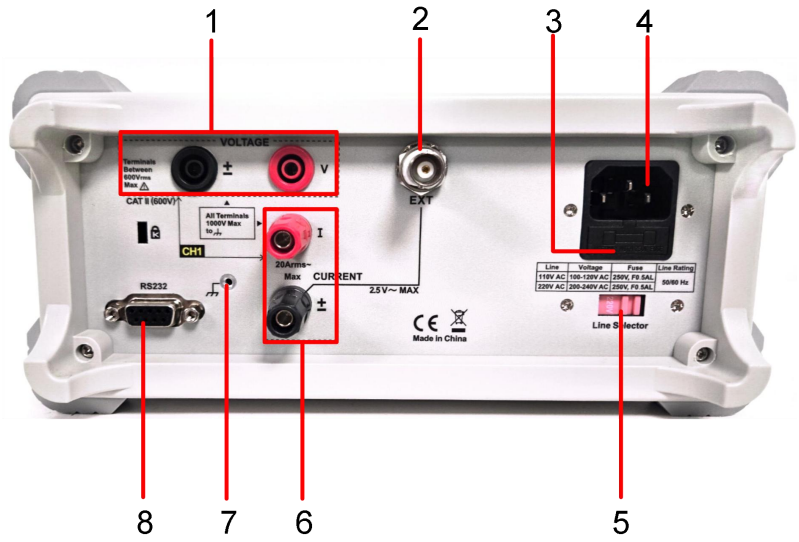


The components of the front panel are defined as follows:

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 Channel Voltage U+ U-:** Measured voltage of CH2. **CH2 Channel Current I+ I-:** Measured current of CH2, with built-in current sensor. **CH2 Channel Current I+-:** Measured current of CH2, with external current sensor.

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



1	**CH1 voltage terminal**	The red V and black ± are the CH1 voltage sampling terminals.
2	**External Sensor**	External BNC Current Sensor
3	**Fuse**	Power supply fuse.
4	**AC power terminal**	The power cord inputs AC power from this connection terminal to the input terminal.
5	**Line switcher**	110V/220V AC voltage selection switch

6	**CH1 current terminal**	The red I and black ± are the CH1 current terminals.
7	**Ground**	Protective grounding.
8	**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 INFO** 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.

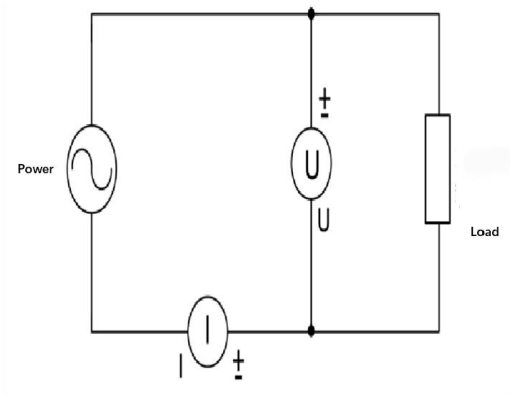
3.5.1 Precautions before connection

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

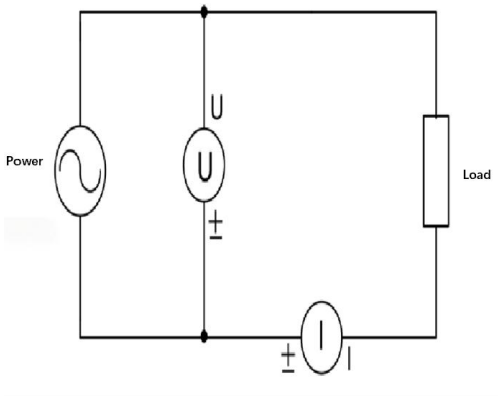
4mm^2.

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. Measurement conditions

4.1 Setting the Crest Factor and Measurement Range

For the power meter, crest factor (CF) is defined as the ratio of the waveform peak value to the rated RMS value. CH1 has two ranges: CF = 3 and CF = 6. For example, when CF = 3 and the voltage range is 600V, the voltage peak that CH1 can measure is 600V * 3 = 1800V. The voltage range, current range, effective input range, and measurement accuracy depend on the crest factor setting.

Therefore, to perform accurate measurements, it is necessary to set the appropriate crest factor and voltage and current measurement ranges. The selected range is effective for different measurement modes. The voltage and current ranges of the power meter are shown in the table below.

Voltage Range	Current Range
CH1: CF=3:75V/150V/300V/600V/Auto CF=6:37.5/75V/150V/300V/Auto CH2: 50V/100V/500V/1000V/Auto	CH1: CF=3:0.2A/1A/4A/20A/Auto(Built-in) CF=6:0.1A/0.5A/2A/10A/Auto(Built-in) CF=3:0.05V/0.1V/0.2V/0.5V/1V/2V/2.5V (Built-in) CH2: 0.2A/1A/4A/20A/Auto(Built-in) 0.05V/0.1V/0.2V/0.5V/1V/2V/2.5V(External)

Voltage and Current Ranges

The measurement range is set based on the levels of RMS value (CH1) and peak value (CH2). When inputting voltage or current signals into the input element, fixed range and auto range are available. The input of the external current sensor has a fixed range and only operates when CF=3.

Fixed Range

Select the desired range from multiple options. Once selected, the range will not change regardless of variations in the input signal level.

For example, voltage range for CH1:

- **Crest factor(CF) of 3:** The maximum option is "600V", and the minimum

option is "75V".

- **Crest factor(CF) of 6:** The maximum option is "300V", and the minimum option is "37.5V".

The ranges for other models will differ, please refer to the display of the specific model.

Auto-ranging Setting

Automatically switches range according to the magnitude of the input signal. The available ranges are the same as those for fixed ranges.

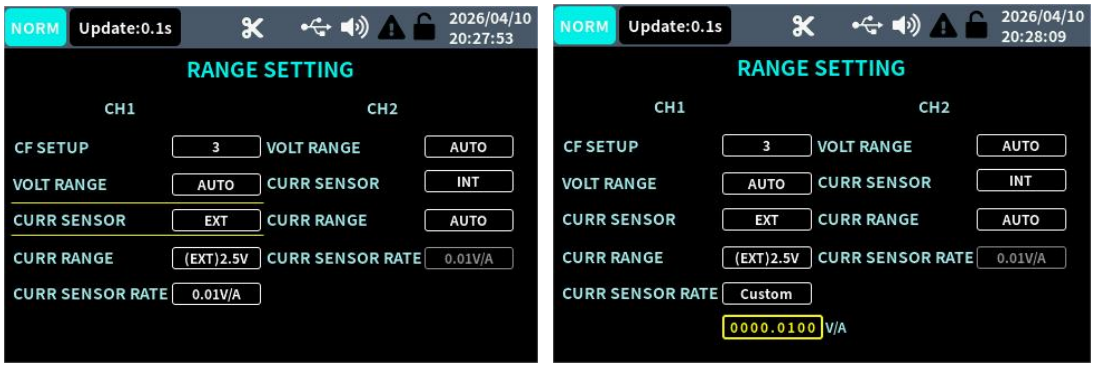
1. **CH1 automatic range upshift principle: The range is upshifted when any of the following conditions are met.**
   1) Urms or Irms exceeds 110% of the currently set range.
   2) CF= 3: The Upk or Ipk value of the input signal exceeds 330% of the currently set range.
   3) CF= 6: The Upk or Ipk value of the input signal exceeds 660% of the currently set range.
2. **CH1 automatic range downshift principle: The range is downshifted when all of the following conditions are met.**
   1) Urms or Irms is less than or equal to 70% of the lower range.
   2) CF= 3: The Upk or Ipk value of the input signal is less than 300% of the lower range.
   3) CF= 6: The Upk or Ipk value of the input signal is less than 600% of the lower range.
3. **CH2 automatic range upshift principle: The range is upshifted when the following conditions are met.**
   1) Upk or Ipk exceeds 110% of the currently set range.
4. **CH2 automatic range downshift principle: The range is downshifted when the following conditions are met.**
   1) Upk or Ipk is less than or equal to 70% of the lower range.

Note: When auto-ranging is selected, the range may change if the input waveform is a pulse waveform with an irregular period. In this case, select a fixed range.

Method 1: Operating Steps

1. Select **Menu** to enter the **Range Setting** interface.
2. In the **CF Setting** dropdown box, set the Crest Factor (CF). Two options are available: CF = 3 or CF = 6 (default is CF = 3).

3. After setting the crest factor, select the voltage range using the cursor directional keys to complete voltage range configuration.
4. After setting the voltage range, use the cursor directional keys to select the current sensor (internal or external). If the internal sensor is selected, further choose the current range to complete current-range configuration. If an external sensor is selected, specify the range of the external sensor and set its scaling factor. For example, if the maximum output signal of the external current sensor is 2.2 V with a sensitivity of 0.22 V/A, select the (EXT) 2.5 V current range and set a custom sensor scaling factor of 0.22 V/A. Common current-sensor scaling factors can be selected directly.



Method 2: Operating Steps

1. On the main numeric display interface, if the user needs to set the voltage range, press the **VRange** key to open the voltage range dropdown box, or press the **Auto** key for quick automatic range setting. The **Element** key can be used to switch between different channels for voltage range configuration.
2. If the user needs to set the current range, press the **IRange** key to open the current range dropdown box, or press the **Auto** key for quick automatic range setting. The **Element** key can be used to switch between different channels for current range configuration. Display digits and power range of CH1 when CF=3.

When CF=3，Display digits and power range of CH1

Voltage Range	Current Range			
(V)	0.200A	1.000A	4.000A	20.000A
75.00	15.00W	75.00W	300.0W	1500W
150.0	30.00W	150.0W	600.0W	3000W
300.0	60.00W	300.0W	1200W	6000W
600.0	120.0W	600.0W	2400W	12000W

When CF=6，Display digits and power range of CH1

Voltage Range	Current Range			
(V)	0.100A	0.500A	2.000A	10.000A
37.50	3.75W	18.75W	70.00W	375.0W
75.00	7.50W	37.50W	150.0W	750.0W
150.0	15.00W	75.00W	300.0W	1500W
300.0	30.00W	150.0W	600.0W	3000W

Display digits and power range of CH2

Voltage Range	Current Range			
(V)	0.200A	1.000A	4.000A	20.000A
50.00	10.00W	50.00W	200.0W	1000W
100.0	20.00W	100.0W	400.0W	2000W
500.0	100.0W	500.0W	2000W	10000W
1000.0	200.0W	1000W	4000W	20000W

4.2 Setting the Data Update Rate

During measurement, the measurement interval determines the sampling data range. For the power meter, the measurement interval is defined by both the data update rate and the synchronization source. Each channel of the power meter uses its own voltage signal as the synchronization source. The synchronization source provides a reference signal for measurement, while the data update rate determines the update cycle of the sampled data.

The power meter use the frequency measurement circuit to detect the period of the input signal, and the measurement interval is set as an integer multiple of the detected period. The power meter calculates the measurement values by averaging the sampled data within the measurement interval. However, for functions that measure the maximum values of voltage and current (Ipk+, Ipk-, Upk+, Upk-, Ucf, Icf), the measurement interval is based on the data update cycle. If the rising slope or falling slope appears only once or not at all within the data update cycle, the data update cycle itself is taken as the measurement interval.

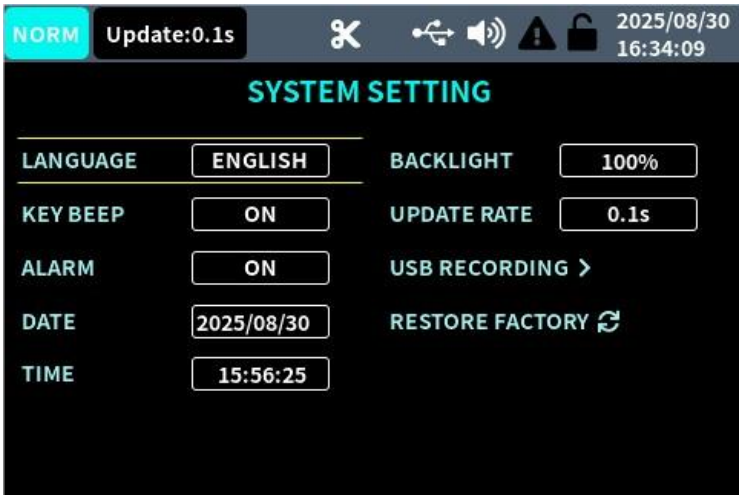
Note:

1. Data Update Rate: The time interval for each data update of the power meter. Available settings: 0.1 s, 0.2 s, 0.5 s, 1 s, 2 s, 5 s.
2. Data Update Cycle: The period of sampling data used for measurement

functions, equal to the set data update rate.

Operating Steps

- Method 1: Press the **Update Rate** key on the panel. The data update rate can be set cyclically among 0.1 s, 0.2 s, 0.5 s, 1 s, 2 s, and 5 s.
- Method 2: Enter the System Settings via the **Menu**. In the Data **UPDATE RATE** dropdown box, select the desired update rate.



Note: The data update rate is only effective in Normal Mode. When the input signal frequency is relatively low, the numeric display may become unstable and difficult to read. In this case, setting a larger data update rate allows averaging over a longer period to obtain more stable measurement data.

4.3 Valid Input Range and Abnormal Data Handling

For the power meters:

- Channel 1 and Channel 2 rated voltages are 600 Vrms and 1000 Vpk, supporting continuous input of 700 Vrms and 1100 Vpk, with maximum rated peak voltages of 1800 V (at CF=3) and 1100 V.
- The rated maximum of the built-in current sensor is 20 Arms and 20 Apk, supporting continuous input of 24 Arms and 24 A, with maximum rated peak currents of 60 A (at CF=3) and 30 A.
- The rated maximum of the external current sensor is 25 kA rms, with a peak current up to 75 kA pk.

Abnormal Data Handling:

- When voltage **Urms** or current **Irms** is zero, related parameters including active power **P**, apparent power **S**, reactive power **Q**, power factor **λ**,

phase angle **φ**, voltage frequency **fU**, voltage peak **Upk**, current peak **Ipk**, voltage crest factor **CfU**, and current crest factor **CfI** are not calculated, and “----” is displayed.

- When the voltage or current exceeds the measurement range (CH1 voltage Urms exceeds 1.2 times the current range, and current Irms exceeds 1.2 times the current range; CH2 voltage Upk exceeds 1.1 times the current range, and current Ipk exceeds 1.2 times the current range), “OVER” is displayed, indicating overrange. In this case, P, S, and Q also display “OVER”.
- For DC input, if no frequency is detected, the panel displays “----”. For AC input, if fU frequency is outside the 38–72 Hz range, the panel displays “ERR”.
- When |U1pk+| or |U1pk-| exceeds CF × current voltage range, the panel displays “OVER”.
- When |I1pk+| or |I1pk-| exceeds CF × current current range, the panel displays “OVER”.
- When |U2pk+| or |U2pk-| exceeds 1.1 times the current voltage range, the panel displays “OVER”.
- When |I2pk+| or |I2pk-| exceeds 1.2 times the current current range, the panel displays “OVER”.
- When active power values used for efficiency calculations (η1, η2) overflow, the panel displays “OVER”.
- The range of THD (Total Harmonic Distortion) is [0, 400%]. If the value exceeds this range, the panel displays “ERR”.

5. 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.

6. Appendix

6.1 Appendix A: Accessories

(Images for reference only, subject to the actual product.)

Standard Accessories:



Power cord



Quick Guide



Banana plug to crocodile clip test leads



RS232 Cable

Optional Accessories:



Banana head



Terminal Box Accessories

6.2 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.

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