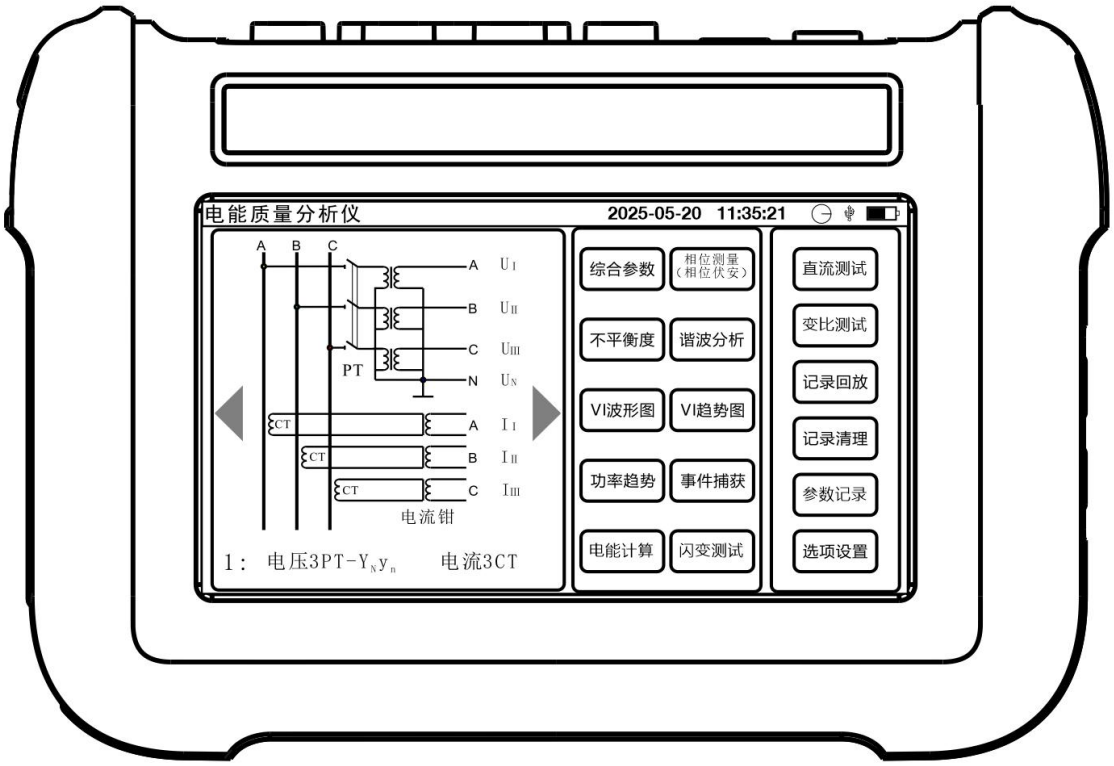
Huazheng®

HZCR-5230
Power Quality Analyzer



MANUAL

Content

WARNING

Thank you for purchasing our HZCR-5230 Power Quality Analyzer. To better use this product, please be sure :

------Read this user manual carefully.

------Strictly follow the safety rules and precautions listed in this manual.

◆ Improper use of the instrument may cause electric shock, explosion or fire.

★ In any case, pay special attention to safety when using this instrument.

★ Pay attention to the labels and symbols on the front and rear panels of the instrument.

★ Use, disassemble and repair of this meter must be performed by authorized qualified personnel.

★ If continued use of the instrument may cause danger due to instrument issues, stop using it immediately, seal it, and have it handled by an authorized institution.

★ The "danger" symbol on the meter and in the manual indicates that the user must follow the instructions for safe operation.

★ The "extremely dangerous" symbol in the manual indicates that the user must strictly follow the instructions for safe operation.

★ When removing or replacing the battery or TF card, ensure that the measurement leads, current clamps, and power adapter are disconnected and the power is turned off.

★ When replacing the TF card by yourself, please contact official customer service for TF card authorization before normal use.

★ Current clamps must be correctly connected to the corresponding channels of the meter; otherwise, measurement errors may increase.

★ If the battery or TF card slot is missing, damaged, or not properly installed, do not use the instrument.

★ Any system safety issues not related to this instrument are the responsibility of the system's builder and operator.

★ For your safety, only use the leads and accessories supplied with the device (compliant with IEC61010-031(2002) standard). When a low-voltage category sensor or accessory is connected to the device, it must be suitable for the system.

★ Frequently check that the test leads, current clamps and accessories are in optimal condition before use. Any lead, current clamp or accessory with damaged insulation (even partial) must be repaired or discarded.

★ If the environment requires, use personal protective equipment.

★ This instrument must be used in Category IV installations (IEC61010-1 standard) where the AC/DC voltage to ground does not exceed 600V, or in Category III installations where the voltage does not exceed 1000V. Do not use in higher voltage networks or categories.

★ Only use the power adapter or battery pack provided by the manufacturer, which have specific safety ratings.

★ Follow the safety level limitations of accessories or current clamps and avoid connecting to unused terminals.

★ Under hazardous voltage, some current clamps cannot be installed or removed from exposed conductors.

◆ Use and Connection Steps:

★ Turn on the instrument.

★ Set the instrument parameters according to the desired results and network type.

★ Connect the voltage test leads and current clamps to the instrument.

★ Connect the voltage test leads for ground and/or neutral to the ground and/or neutral of the power grid.

★ Connect the phase L1 lead to the L1 phase of the grid and clamp the corresponding current clamp onto the L1 phase.

★ Repeat the above connection process for L2 and L3.

Note: Following this procedure will minimize connection errors and avoid wasting time.

◆ Disconnection Steps:

★ Disconnect in reverse order (generally disconnect ground or neutral last).

★ Remove the instrument leads and turn off the power.

★ Charge the battery if necessary and upload the recorded data from the test.

★ USB is used for data transfer; the battery can be charged using the included dedicated adapter.

◆Current Clamp Polarity (Same-name terminal):

★ The side of the current clamp marked (L1, L2, L3, N/D) is the current input direction, i.e., the same-name terminal.

★ For 008B, 032B, 035AD current clamps, the side without the body code is the current input direction, i.e., the same-name terminal.

★ For 050B current clamp, the side with the CT label is the current input direction, i.e., the same-name terminal.

1. Introduction

HZCR-5230 Power Quality Analyzer is a high-precision comprehensive test instrument carefully developed by our company for on-site testing of three-phase power quality.

The meter features intelligence, comprehensive functions, simple human-machine operation, and a bilingual Chinese/English operation interface.

The meter adopts a 7-inch color touch screen, is small in size, light in weight, easy to carry, and can be equipped with various optional current clamps.

The meter can simultaneously measure 4 current channels (ABC three-phase and neutral current), 3 voltage channels, three-phase unbalance, active power, reactive power, apparent power, harmonic ratio, total harmonic distortion, etc.; display real-time waveforms and phasor diagrams of voltage and current; dynamically capture instantaneous changes in voltage and current, monitor inrush current, monitor various power parameters and generate an alarm list, record test data for long periods and generate trend curve graphs, and other functions.

In current power applications, faults caused by more and more large electrical equipment and increasingly complex power grid systems are becoming more complex and difficult to troubleshoot. As various industries place higher demands on power quality, we provide this measurement and analysis instrument that can more quickly and accurately eliminate complex power system faults, and more comprehensively and systematically monitor and maintain power quality parameters.

HZCR-5230 Power Quality Analyzer uses a 7-inch color touch screen, displaying parameters, waveforms, phasor diagrams, and harmonic ratio graphs of each phase in different colors, allowing users to understand the grid parameter status more efficiently and intuitively.

The Power Quality Analyzer is also known as Intelligent Three-phase Power Quality Analyzer, Multifunctional Power Quality Analyzer, Three-phase Power Quality Analyzer, etc., and also has the functions of Harmonic Analyzer, Phase Voltammeter, Power Parameter Tester, and other instruments.

It is suitable for electric power, petrochemical, metallurgy, railway, industrial and mining enterprises, scientific research institutions, metrology departments, etc.

It is especially suitable for comprehensive analysis and diagnosis of all electrical parameters such as voltage, current, power, energy, harmonics, phase, etc.

2. Functions

★ Real-time waveform display (3 voltage / 4 current).
★ True RMS of voltage and current.
★ Phasor diagram display.
★ Measurement of harmonics per phase, up to the 51st harmonic.
★ Bar graph display of harmonic content ratio of each phase current and voltage.
★ Total Harmonic Distortion (THD).
★ Voltage and current crest factor, transformer K factor.
★ Active / reactive / apparent power values per phase and total.
★ Voltage, current and power trend graph.
★ Long flicker and short flicker test.
★ Three-phase unbalance measurement (voltage and current).
★ Record waveforms and parameters.
★ Screenshot saving.
★ Touch screen operation.
★ Voltage flicker, voltage swell and sag capture.
★ Inrush current and surge current monitoring.
★ USB communication with host computer.
★ Set the instrument's wiring mode and grid type.
★ Select different current clamps and different voltage test ratios.
★ Energy calculation.
★ Recorded data can export analysis reports according to national standards.
★ One-key access to phase voltammetry, ratio test, DC test.
★ DC voltage, DC current, DC power.

3. Technical Specifications

3.1. Reference Conditions and Operating Conditions

Influence Quantity	Test Item	Reference Conditions	Operating Conditions
Ambient Temperature	All Parameters	(23±2)℃	-10℃ ~ 40℃
Relative Humidity	All Parameters	40% ~ 60%	< 80%
Voltage	Measure True RMS Voltage	(220±1%)V	0.001V ~ 1000V
Current	Measure True RMS Current	(5±1%)A	10mA ~ 6000A
Grid Frequency	All Parameters	50Hz ± 0.1Hz	40Hz ~ 70Hz
Harmonics	All Parameters	< 0.1%	0.0% ~ 100%
Voltage Unbalance	All Parameters	< 10%	0.0% ~ 100%
Instrument Operating Voltage	All Parameters	DC 7.4V ± 0.1V	DC 6.8V ~ 8.4V
External Electric Field, Magnetic Field	All Parameters	Should be avoided	
Position of Conductor Under Test	Parameters related to current measurement	Conductor under test is positioned near the geometric center of the jaw opening	

3.2. General Specifications

Power Supply	DC 7.4V, 5200mAh rechargeable lithium battery, external charger.
Display Screen	7-inch color touch screen.
Operating Current	Approx. 490mA.
Jaw Opening Size	008B Current Clamp: Φ8mm; (Optional) 032B Current Clamp: 32mm×42mm; (Optional) 050B Current Clamp: Φ50mm; (Optional) 300FA Current Clamp: Φ300mm; (Optional) 035AD Current Clamp: φ30mm×35mm (Optional)
Number of Channels	3 voltage channels, 4 current channels.
AC Voltage Range	0.001V ~ 1000V.
DC Voltage Range	0.1V ~ 1000V.
Current	008B Current Clamp: AC 10mA ~ 10.0A; (Optional) 032B Current Clamp: AC 0.1A ~ 100A; (Optional) 050B Current Clamp: AC 1A ~ 1000A; (Optional) 300FA Current Clamp: AC 10A ~ 6000A; (Optional) 035AD Current Clamp: DC 0.1A ~ 1000A (Optional)
Frequency	40Hz ~ 70Hz.
Harmonics	Yes, 2nd ~ 51st.
Total Harmonic Distortion	Yes, 2nd ~ 51st, per phase.
Voltage Flicker	Short flicker and long flicker.
Three-phase Unbalance	Yes.
Menu Language	Switchable between Chinese and English.
Auto Power Off	When the recording function is turned on, the instrument does not automatically power off. When the recording function is not turned on, it can automatically power off after the set time of 15 minutes, 30 minutes, or 60 minutes.
Memory Card (TF card)	8G (expandable to 32G).
Voltage Test Lead Length	3m.
Current Clamp Cable Length	2m.
Battery Level Indication	Battery symbol shows power level. When the battery level is too low, the instrument will automatically power off.
Input Impedance	Test voltage input impedance: 3MΩ.
Dielectric Strength	Withstand 3700V/50Hz sinusoidal AC voltage between instrument circuit and housing for 1 minute.

Insulation	Between instrument circuit and protective housing: ≥10MΩ.
Structure	Double insulation, with insulated vibration-proof protective sleeve.
USB Communication	Install the host computer software to upload test record data to a computer for storage, analysis, and printing.
Meter Dimensions	Length × Width × Thickness: 240mm × 170mm × 68mm.
Meter Weight	Host: Approx. 1240g (including battery); 008B Current Clamp: Approx. 180g × 4; (Optional) 032B Current Clamp: Approx. 248g × 4; (Optional) 050B Current Clamp: Approx. 520g × 4; (Optional) 300FA Current Clamp: Approx. 140g × 4; (Optional) 035AD Current Clamp: Approx. 240g × 4; (Optional) Accessories Weight: Approx. 3.34kg (accessories only); Total Weight: Approx. 10.2kg (including packaging, complete set of current clamps and accessories).
Operating Temperature & Humidity	-10℃ ~ 40℃; below 80%RH.
Storage Temperature & Humidity	-10℃ ~ 60℃; below 70%RH.
Suitable Safety Standard	IEC 61010 1000V Cat III / 600V Cat IV, IEC61010-031, IEC61326, Pollution Degree 2. GB/T 15945-2008, GB/T 15543-2008, GB/T 12326-2008, GB/T 12325-2008, GB/T 14549-1993.

3.3. Instrument Accuracy Description (excluding current sensors)

The following data are introduced based on reference conditions and an ideal current sensor (completely linear with no phase shift).

Measurement	Measuring Range	Display Resolution	Maximum Error within Reference Range
Frequency	40Hz ~ 70Hz	0.001Hz	±(0.01)Hz
Voltage True RMS	0.001V ~ 1000V	Min resolution 0.001V	±0.5%rdg ± 0.1%fs
DC Voltage	0.1V ~ 1000V	Min resolution 0.1V	±(0.5%rdg ± 5dgt)
Current True RMS	0.01A ~ 6000A	Min resolution 0.001A	±(0.5%rdg ± 5dgt)
DC Current	0.1A ~ 1000A	Min resolution 0.1A	±(0.5%rdg)
Crest Factor	1.000 ~ 3.999	0.001	±(1%rdg + 2dgt)
	4.000 ~ 9.999	0.001	±(5%rdg + 2dgt)
Active Power	0.001W ~ 6000kW	Min resolution 0.001W	±(1%rdg + 3dgt) Cosφ ≥ 0.8
			±(1.5%rdg + 10dgt) 0.2 ≤ Cosφ < 0.8
Reactive Power	0.001VAR ~ 6000kVAR	Min resolution 0.001VAR	±(1%rdg + 3dgt) Sinφ ≥ 0.5
			±(1.5%rdg + 10dgt) 0.2 ≤ Sinφ < 0.5
Apparent Power	0.001VA ~ 6000kVA	Min resolution 0.001VA	±(1%rdg + 3dgt)
Power Factor	-1.000 ~ 1.000	0.001	±(1.5%rdg + 3dgt) Cosφ ≥ 0.5
			±(1.5%rdg + 10dgt) 0.2 ≤ Cosφ < 0.5
Active Energy	0.001kWh ~ 9999.999MWh	Min resolution 0.001kWh	±(1%rdg + 3dgt) Cosφ ≥ 0.8
			±(1.5%rdg + 10dgt) 0.2 ≤ Cosφ < 0.8
Reactive Energy (Inductive	0.001kVARh ~	Min resolution	±(1%rdg + 3dgt) Sinφ ≥ 0.5

& Capacitive)	9999.999MVARh	0.001kVARh	±(1.5%rdg + 10dgt) 0.2 ≤ Sinφ < 0.5
Apparent Energy	0.001kVAh ~ 9999.999MVAh	Min resolution 0.001kVAh	±(1%rdg + 3dgt)
Voltage Harmonic Ratio (Vrms > 50V)	0.0% ~ 99.9%	0.001%	(2nd ~ 20th) ±(1%rdg + 5dgt)
			(21st ~ 30th) ±(1%rdg + 10dgt)
			(31st ~ 51st) ±(1%rdg + 15dgt)
Voltage Harmonic Angle (Vrms > 50V)	-179° ~ 180°	0.001°	±(3°) for 2nd ~ 25th harmonics
			±(10°) for 26th ~ 51st harmonics
Current Harmonic Ratio (Arms > I range ÷ 100)	0.0% ~ 99.9%	0.001%	(2nd ~ 20th) ±(1%rdg + 5dgt)
			(21st ~ 30th) ±(1%rdg + 10dgt)
			(31st ~ 51st) ±(1%rdg + 15dgt)
Current Harmonic Angle (Arms > I range ÷ 100)	-179° ~ 180°	0.001°	±(3°) for 2nd ~ 25th harmonics
			±(10°) for 26th ~ 51st harmonics
Total Harmonic Distortion Rate (DF or THD-F) ≤ 50	0.0% ~ 99.9%	0.001%	±(1%rdg + 10dgt)
Transformer K Factor	1.000 ~ 99.999	0.001	±(5%)
Three-phase Unbalance	0.0% ~ 100%	0.01%	±(1%)

3.4. Current Clamp Characteristics

Current Clamp Type (Optional)	Current True RMS	Max Resolution	Max Error of Current True RMS	Max Phase Angle φ Error
008B Current Clamp	AC 10mA ~ 10.0A	1mA	±(1%rdg + 0.05%fs)	±(2°)
032B Current Clamp	AC 0.10A ~ 100A	1mA	±(1%rdg + 0.05%fs)	±(2°)
050B Current Clamp	AC 1.0A ~ 1000A	1mA	±(2%rdg + 0.05%fs)	±(2°)
300FA Current Clamp	AC 10.0A ~ 6000A	1mA	±(1%rdg + 0.05%fs)	±(2°)
035AD Current Clamp	DC 0.1A ~ 1000A	0.1A	±(3%rdg + 0.05%fs)	

Note: Current clamps must be correctly connected to the corresponding channels of the meter. Do not reverse the connection. The polarity (same-name terminal) direction of the current clamp is as follows:

★ The side of the current clamp marked (L1, L2, L3, N/D) is the current input terminal, i.e., the same-name terminal.

4. Product Structure

4.1. Product Composition

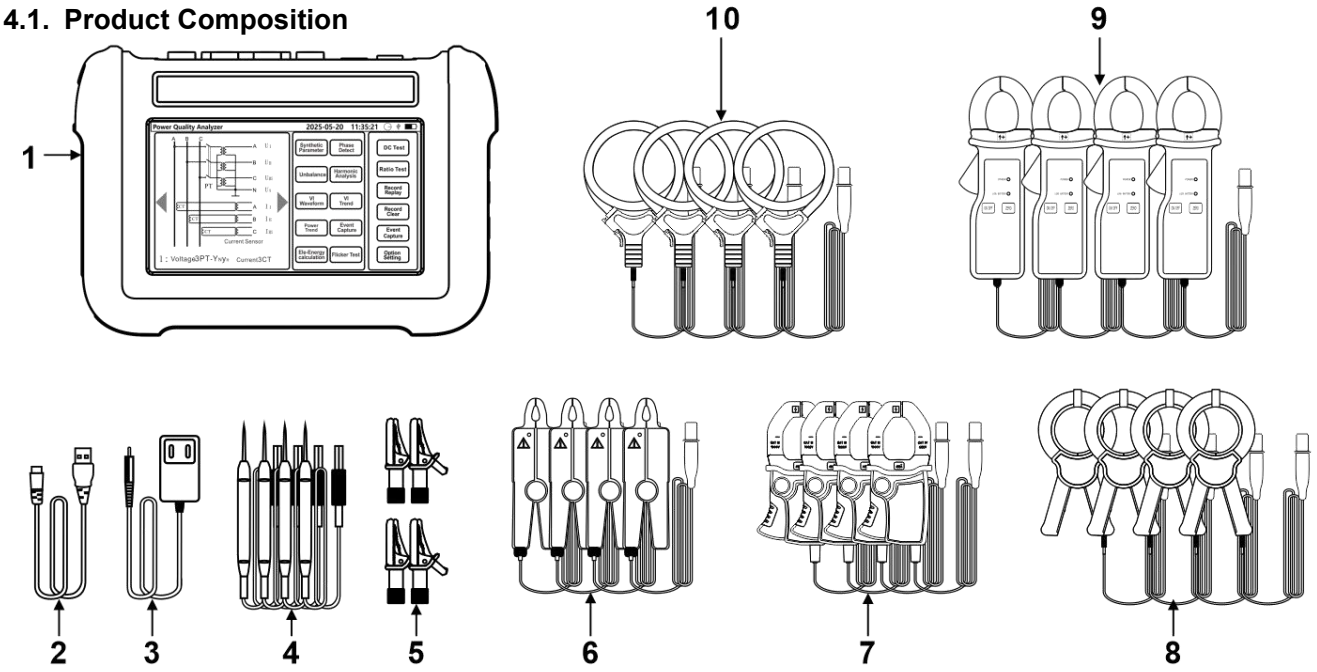


Figure 1 - Product Structure Diagram

No.	Description	No.	Description
1	Host	6	008B Current Clamp
2	USB Data Cable	7	032B Current Clamp
3	Dedicated Power Adapter	8	050B Current Clamp
4	Pen Probe Test Lead	9	035AD Current Clamp
5	Alligator Clip	10	300FA Current Clamp

4.2. Host Structure

No.	Description
1	Test Lead Interface & Charge Interface
2	Display Screen
3	Power Button
4	Back Button

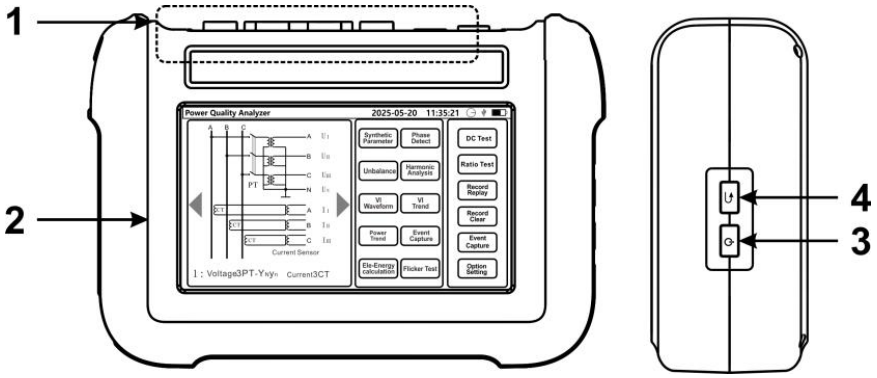


Figure 2 - Host Structure

4.3. Host Interface

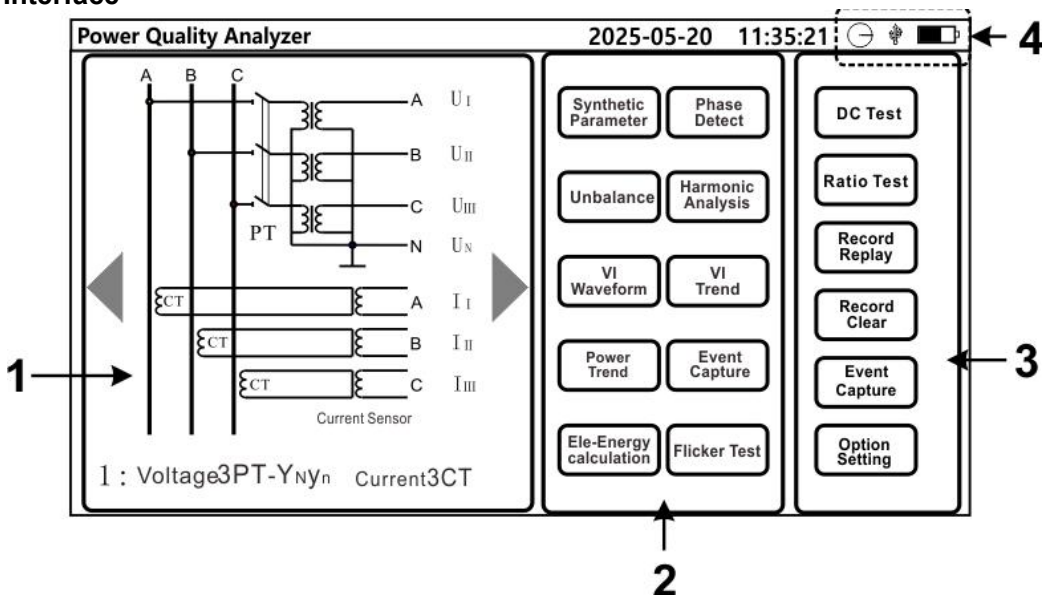


Figure 3 - Host Interface Diagram

No.	Description	No.	Description
1	Wiring Diagram	3	Setting Function Button Group
2	Test Function Button Group	4	Card Capacity, USB, Battery Power Indicator

5. Meter Buttons

5.1. Power Button

Used for power on/off control.

5.2. Back Button

Used to return to the previous interface.

5.3. Wiring Connection

1) Measurement Connection Ports

The connection ports are located on the top of the instrument, as shown in Figure 4.

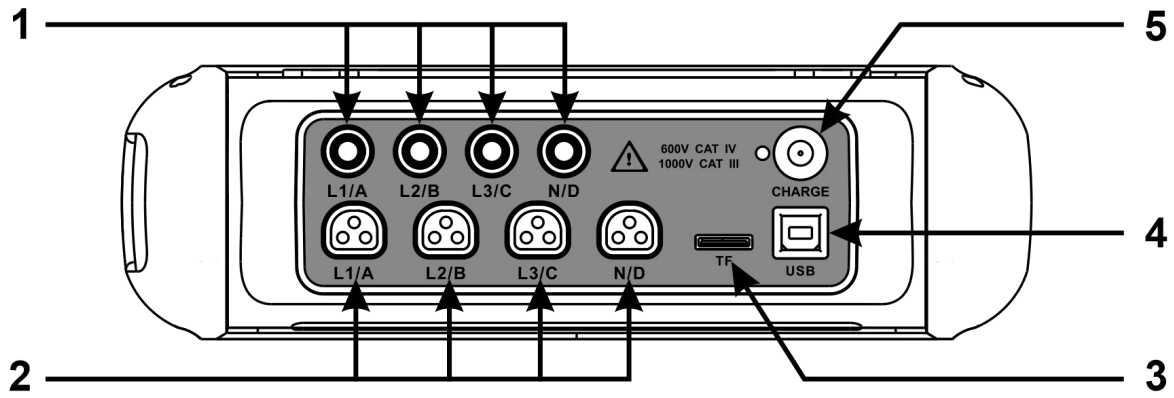


Figure 4 - Host Top View

No.	Description	No.	Description
1	Voltage Test Lead Port	4	USB Data Cable Port
2	Current Test Lead Port	5	Charging Port & Charge Indicator
3	Memory Card Slot		

2) Charging Interface and USB Interface
Must use the dedicated power adapter and USB data cable supplied with the product.

6. Function Summary

6.1.Measurement Functions

- AC voltage value between devices (up to 1000V).
- DC voltage value (up to 1000V).
- AC current value (up to 6000A).
- DC current value (up to 1000A).
- Continuous voltage and current values.
- 50Hz or 60Hz power grid.
- Voltage and current multiple harmonic ratio and total harmonic ratio (excluding neutral).
- Active power, reactive power (capacitive and inductive) and apparent power per phase (excluding neutral).
- Power factor (PF).
- Active energy, reactive energy (capacitive and inductive) and apparent energy per phase (excluding neutral).
- Voltage and current harmonics (up to 51st, excluding neutral): harmonic content ratio, total harmonic content ratio, fundamental RMS value.
- Temperature monitor: can display the internal temperature of the device.
- Phase measurement between voltage and current.
- Short and long voltage flicker.
- Transformer K factor.
- Crest factor.

6.2.Setting Functions

- Time and date setting.
- Grid wiring selection (single-phase, 3-phase 3-wire or 4-wire).
- Voltage measurement ratio and current clamp selection.
- (All or partial) data deletion.
- 50Hz or 60Hz grid selection.
- Voltage and current unbalance formula selection.

7. Operating Method

The instrument must be set up before use. For settings, refer to Chapter 5 of this manual.
Please be sure to follow the following pre-use instructions:

- Do not measure voltage exceeding 1000V RMS to ground.
- Before installing or removing the rechargeable battery, ensure that no test leads are connected to the instrument and that the power is off.

7.1. Power On and Off

Briefly press the ⏻ button to turn on the instrument. Press and hold the ⏻ button until a beep is heard, then release ⏻ to turn off the instrument.
After about 3 seconds, the main screen is displayed as shown in Figure 5.

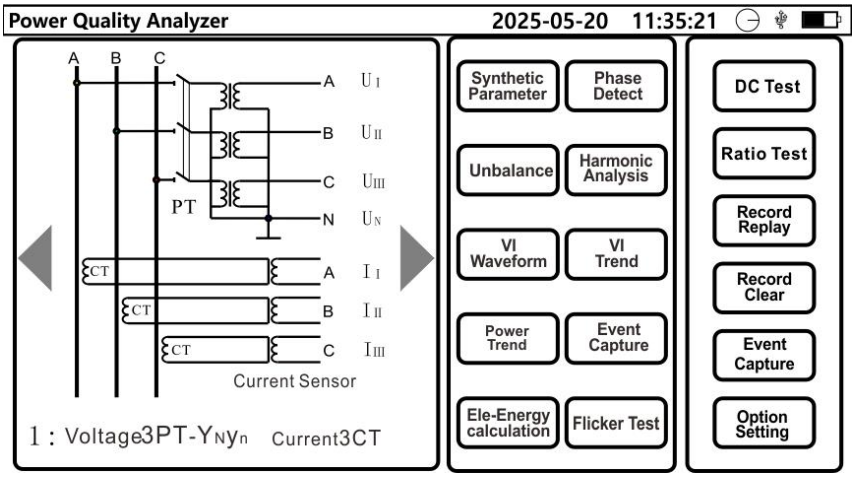


Figure 5 - Main Interface

7.2. Lead Connection

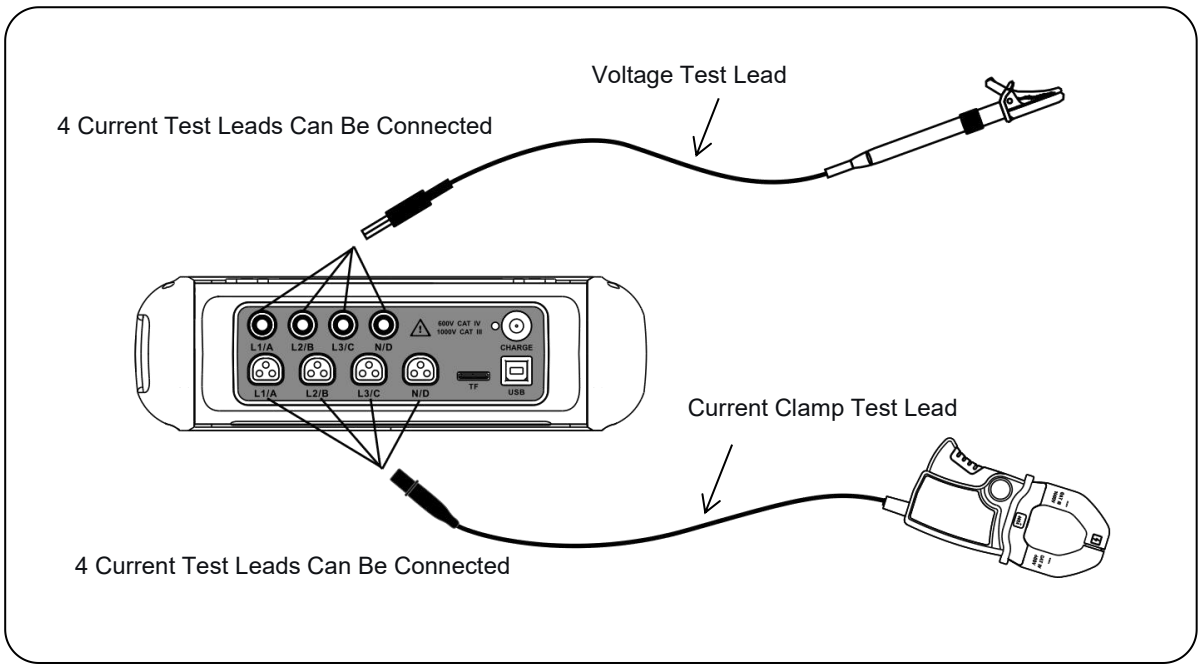


Figure 6 - Top Lead Connection Diagram

Connect the measurement leads as follows:

- Current measurement: Connect the 4 current clamps to the corresponding current interfaces L1/A, L2/B, L3/C, N/D on the meter. The current clamps must be connected correctly to ensure measurement accuracy. Before measurement, select the current clamp to be used and set the current ratio.
- Voltage measurement: Connect the 4 voltage test leads by color to the corresponding voltage input interfaces L1/A, L2/B, L3/C, N/D on the meter. Before measurement, set the voltage ratio.

Connect the test leads to the circuit under test according to the wiring method in Section 8.3.

7.3. Test Steps

★ Turn on the instrument.
★ Set the voltage and current ratios, select the current clamp, and choose the grid wiring mode.
★ Connect the leads and current clamps to the instrument.
★ Clamp the neutral current clamp onto the neutral wire.
★ Connect the L1 phase voltage test lead to the L1 phase of the grid, and clamp the L1 current clamp onto the L1 wire.
★ If necessary, repeat the above connection for L2 and L3 phases.
Note: Following this procedure will minimize connection errors and save time.

7.4. Recording and Screenshot Functions

1) Data recording and screenshot saving can be performed on interfaces that have recording or screenshot functions (calculated based on 8G storage).

Storage Type	Capacity	Storage Type	Capacity
Single-phase comprehensive storage	Approx. 550 days	Three-phase harmonic storage	Approx. 25 days
Single-phase harmonic storage	Approx. 60 days	Three-phase waveform storage	Approx. 12 days
Single-phase waveform storage	Approx. 22 days	Three-phase trend 10T storage	Approx. 1500 days (approx. 7500 days for second storage)
Single-phase trend 10T storage	Approx. 300 days (approx. 1500 days for second storage)	Three-phase four-wire power trend 10T storage	Approx. 1120 days (approx. 5600 days for second storage)
Single-phase power trend 10T storage	Approx. 2450 days (approx. 490 days for second storage)	Three-phase three-wire comprehensive storage	Approx. 285 days
Three-phase four-wire comprehensive storage	Approx. 290 days	Three-phase three-wire phase storage	Approx. 495 days
Three-phase four-wire phase storage	Approx. 650 days	Single-phase event capture storage	Approx. 1.85 million times

2) In the parameter recording mode, you can select the parameters to be recorded. The maximum settable recording time is determined by the number of selected parameters and the sampling period. The following table shows typical cases (calculated based on 8G storage):

Selected Parameters	Sampling Period	Typical Maximum Settable Time
All parameters selected (398 in total)	1 second	60 days
(1~25) parameters	1 second	960 days
All parameters selected (398 in total)	5 seconds	300 days
(1~25) parameters	5 seconds	4800 days
All parameters selected (398 in total)	1 minute	3600 days
(1~25) parameters	1 minute	57600 days

From the above table, it can be seen that the fewer parameters selected and the larger the sampling period, the longer the maximum recordable time.

8. Settings

8.1. Basic Parameter Settings

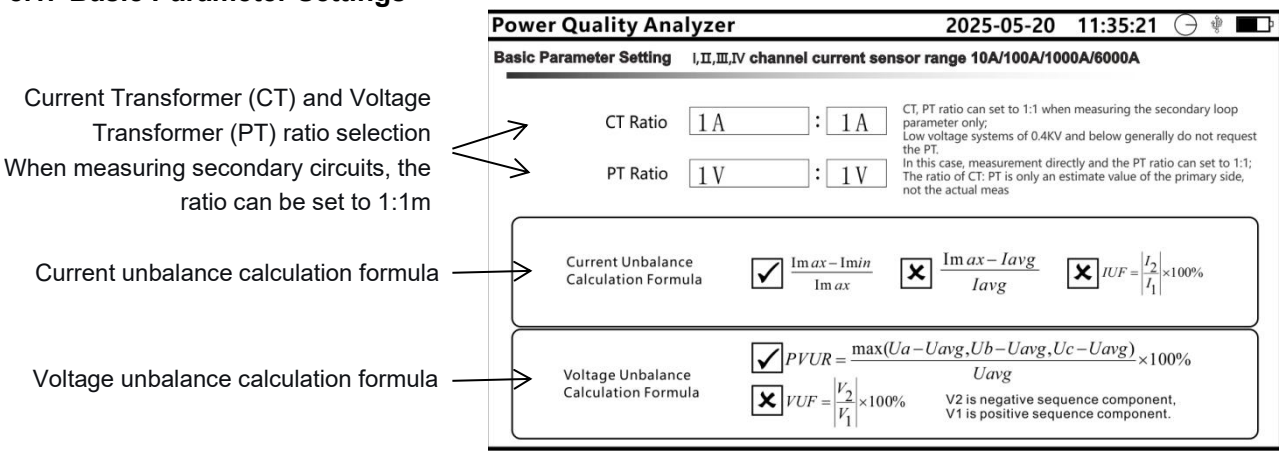


Figure 7 - Basic Parameter Settings Interface

8.2. Option Settings

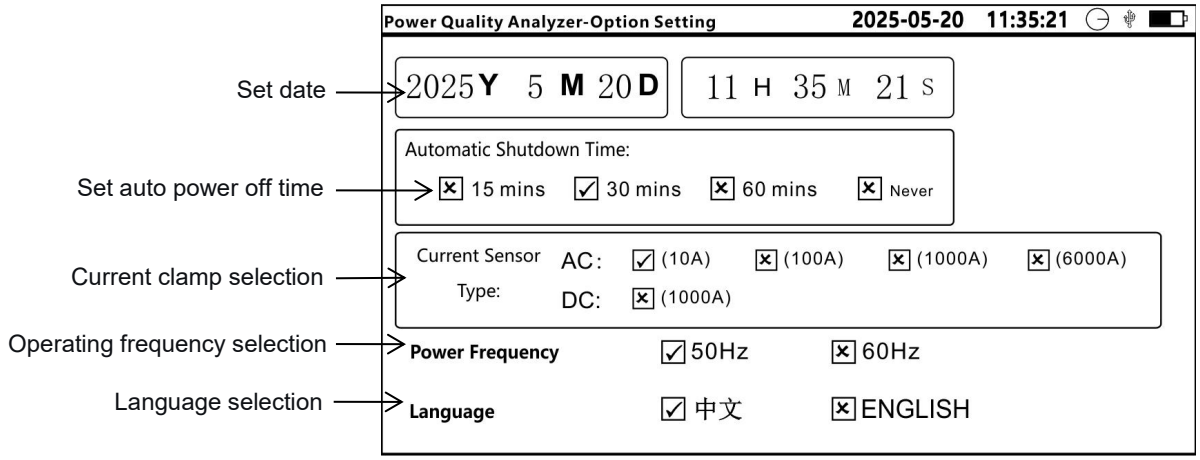


图 8、选项设置界面

8.3. Wiring Mode Selection

There are eight wiring diagrams to choose from. Use the arrows on the left and right sides of the interface to switch.

Figures 9 and 13 show three-phase four-wire wiring, with the same interface.

Figures 10, 11, 14, and 15 show three-phase three-wire wiring, with the same interface.

Figures 12 and 16 show single-phase wiring, with the same interface.

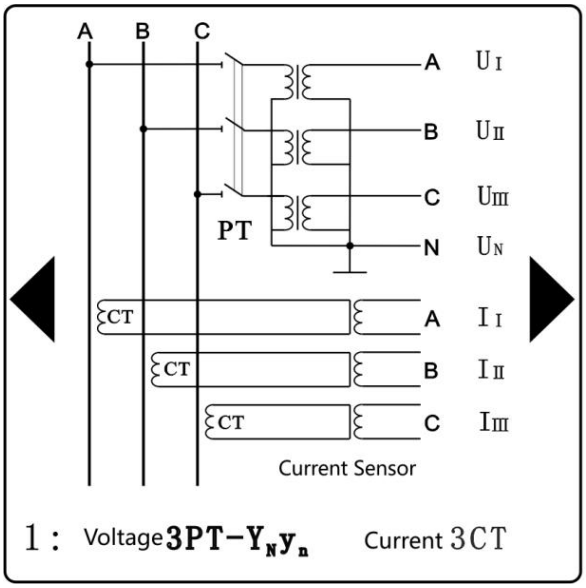


Figure 9 - Voltage 3PT Current 3CT Wiring Diagram

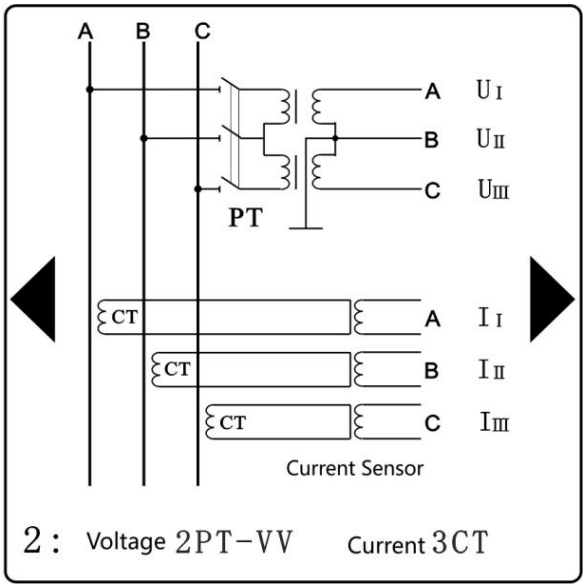


Figure 10 - Voltage 2PT Current 3CT Wiring Diagram

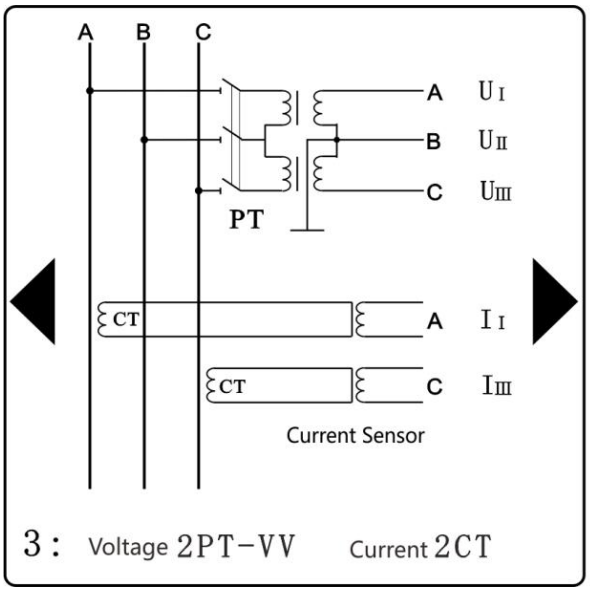


Figure 11 - Voltage 2PT Current 2CT Wiring Diagram

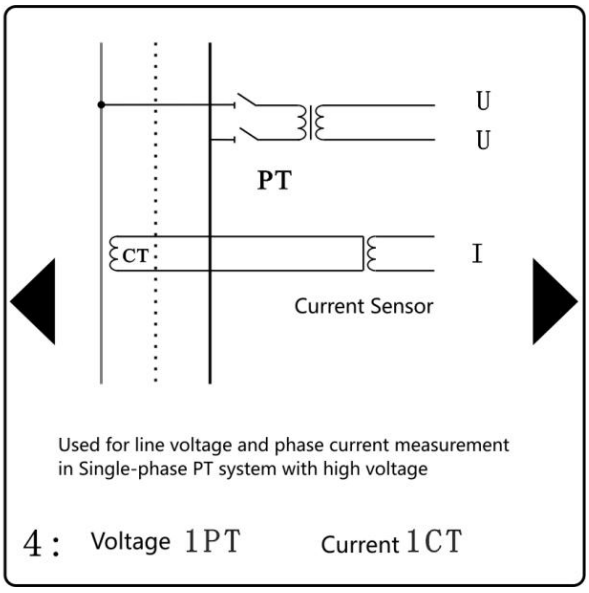


Figure 12 - Voltage 1PT Current 1CT Wiring Diagram

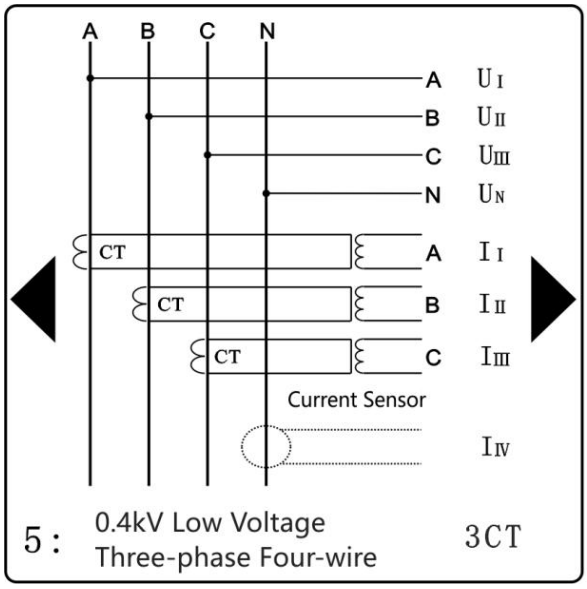


Figure 13 - 0.4kV Low Voltage Three-phase Four-wire 3CT Wiring Diagram

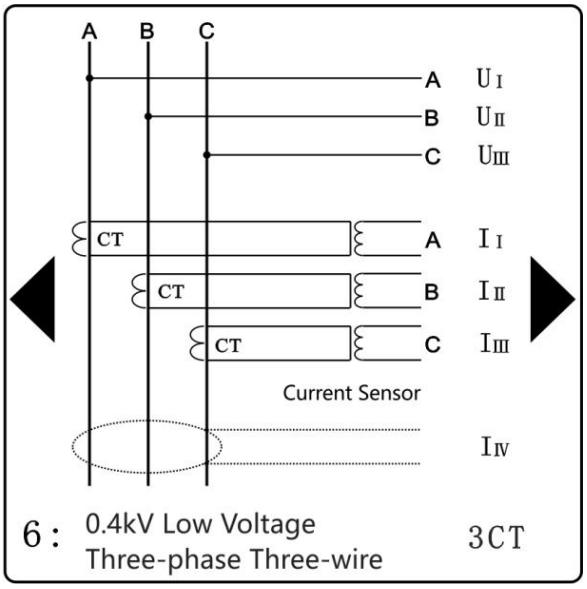


Figure 14 - 0.4kV Low Voltage Three-phase Three-wire 3CT Wiring

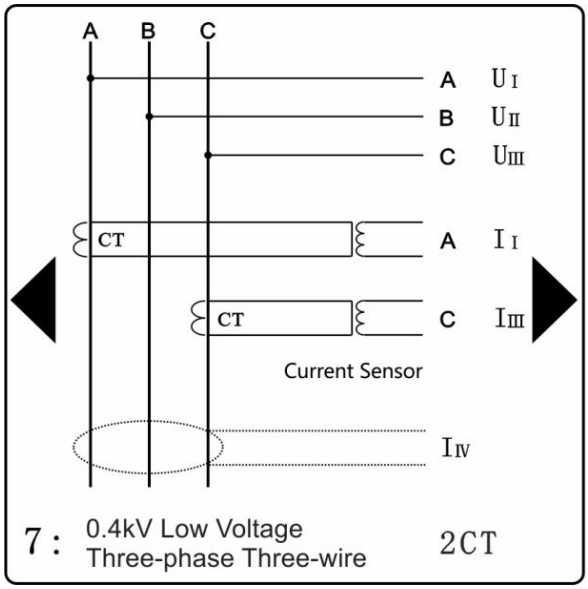


Figure 15 - 0.4kV Low Voltage Three-phase Three-wire 2CT Wiring Diagram

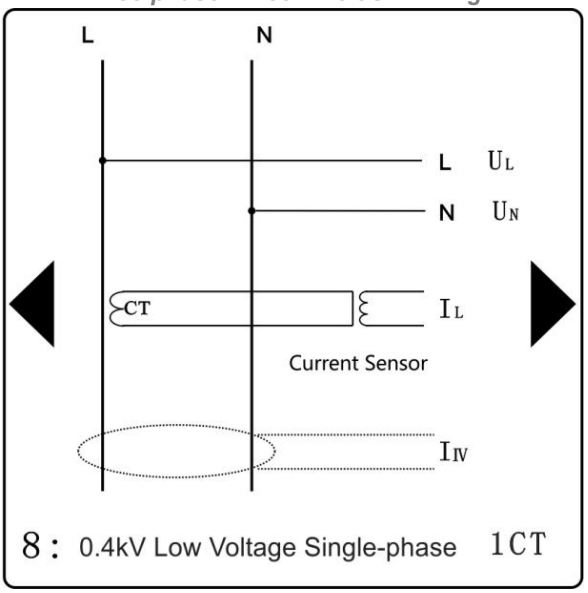


Figure 16 - 0.4kV Low Voltage Single-phase 1CT Wiring Diagram

9. Parameter Recording Mode

The instrument has a parameter recording function, which can record various measured or calculated values, as shown in Figure 17.

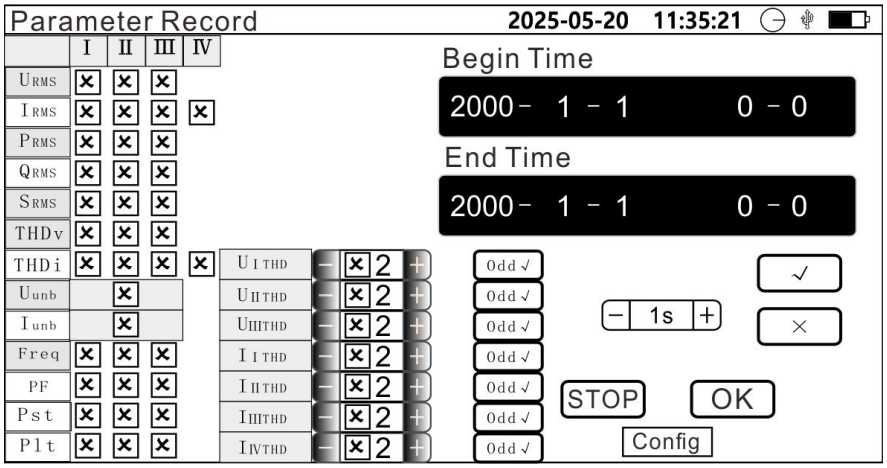


Figure 17 - Parameter Recording Interface

The parameters that can be selected for monitoring are:

Value	Description
Urms	AC voltage RMS value
Irms	AC current RMS value
Prms	Active power
Qrms	Reactive power
Srms	Apparent power
THDv	Voltage harmonic distortion rate
THDi	Current harmonic distortion rate
Uunb	Voltage unbalance
Iunb	Current unbalance
Freq	Grid frequency
PF	Power factor
Pst	Short flicker
Plt	Long flicker
Ucf	Voltage crest factor
Icf	Current crest factor
KF	Transformer K factor
UITHD	Channel 1 voltage harmonic distortion rate per order
UIITHD	Channel 2 voltage harmonic distortion rate per order
UIIITHD	Channel 3 voltage harmonic distortion rate per order
IITHD	Channel 1 current harmonic distortion rate per order
IIITHD	Channel 2 current harmonic distortion rate per order
IIIITHD	Channel 3 current harmonic distortion rate per order
IIVTHD	Channel 4 current harmonic distortion rate per order

You can select all data by clicking the √ on the right, or cancel all data by clicking the × on the right.

Pay special attention to the last seven rows. Clicking √ selects all; clicking again changes it to ×, which selects none. When it is blank, it indicates partial selection.

You can also click "odd" to select all odd-order harmonics, or individually select the harmonic orders to be recorded.

Set the start time, stop time, and recording interval to start recording. If recording fails to start, check whether the start time is later than the current time, whether the end time is after the start time, or whether there is insufficient space on the memory card.

When parameters are selected, the white box in the lower right shows "Configuring". When all conditions for recording are met, clicking Start will change it to "Ready to Record". When the current time reaches or passes the start time, it will change to "Recording".

Click "Stop" to stop recording and generate a recording file; the white box will change back to "Configuring".

10. Test Interface

10.1. Comprehensive Parameters

You can record the interface data by clicking "Record" at 1-second intervals.

In three-phase mode, you can select T/F in the upper left to display full-wave/fundamental current, voltage and power, and select from four angles to display the vector diagram.

In single-phase mode, you can select one of the three channels for display.

1) Three-phase four-wire wiring

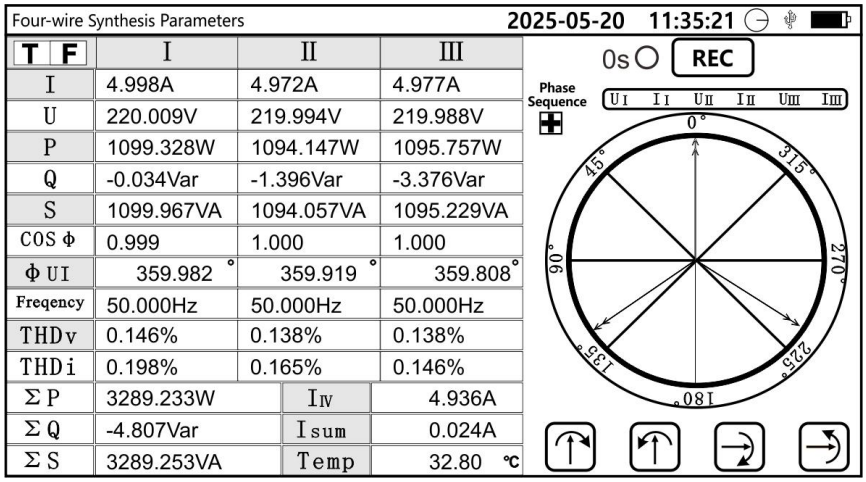


Figure 18 - Comprehensive Parameters - Three-phase Four-wire Test

2) Three-phase three-wire wiring

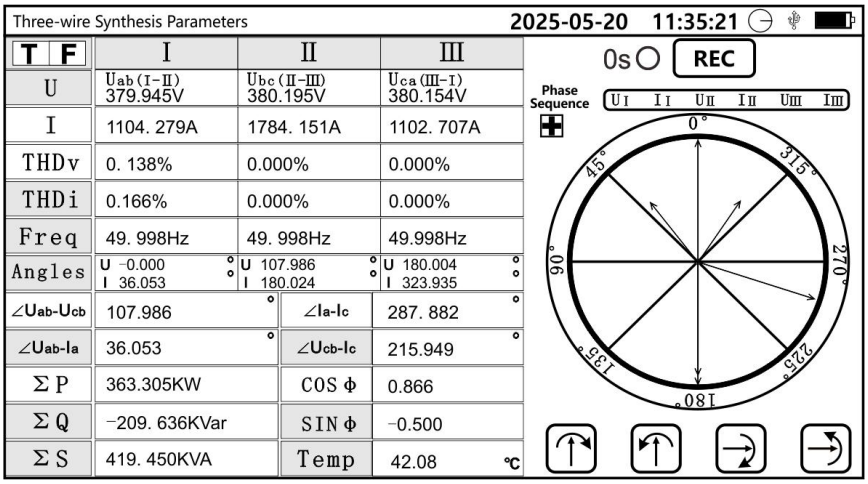


Figure 19 - Comprehensive Parameters - Three-phase Three-wire Test

3) Single-phase wiring

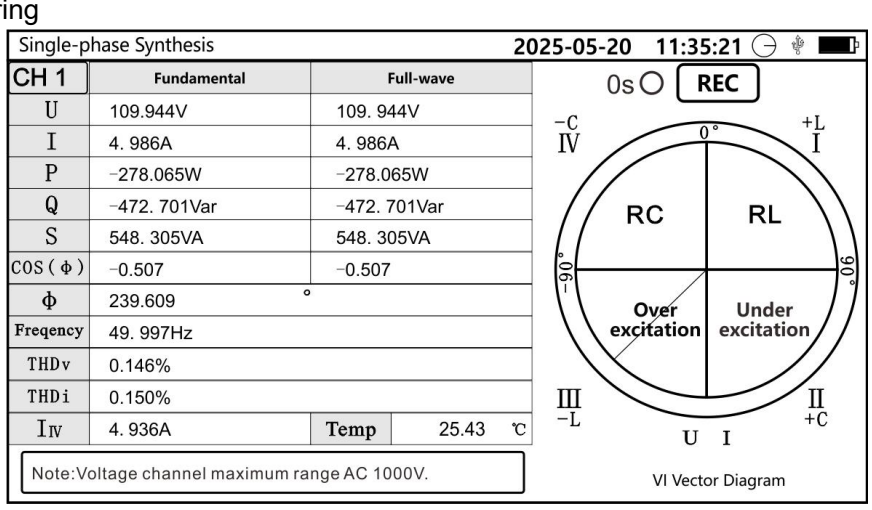


Figure 20 - Comprehensive Parameters - Single-phase Test Interface

10.2. Phase Measurement (Phase Voltammeter)

You can record the interface data by clicking "Record" at 1-second intervals.
In three-phase mode, you can select from four angles to display the vector diagram.
In single-phase mode, you can select one of the three channels for display.

1) Three-phase four-wire wiring

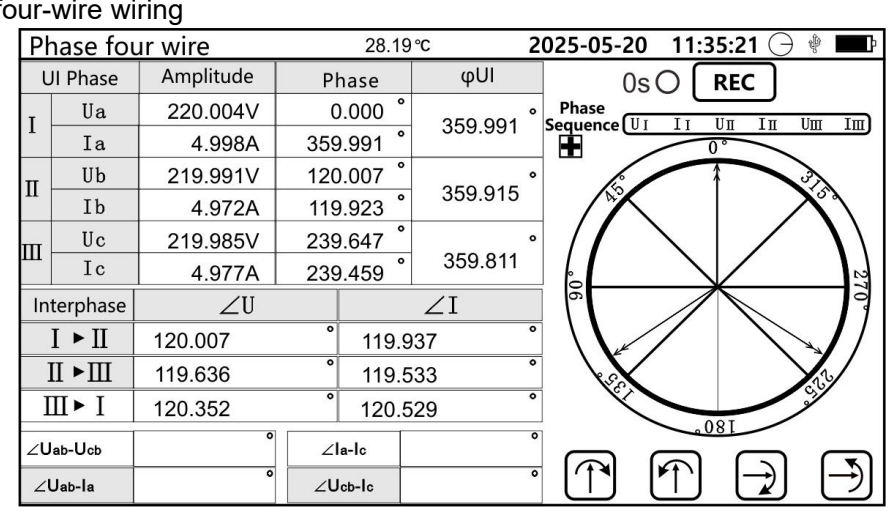


Figure 21 - Phase Measurement - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

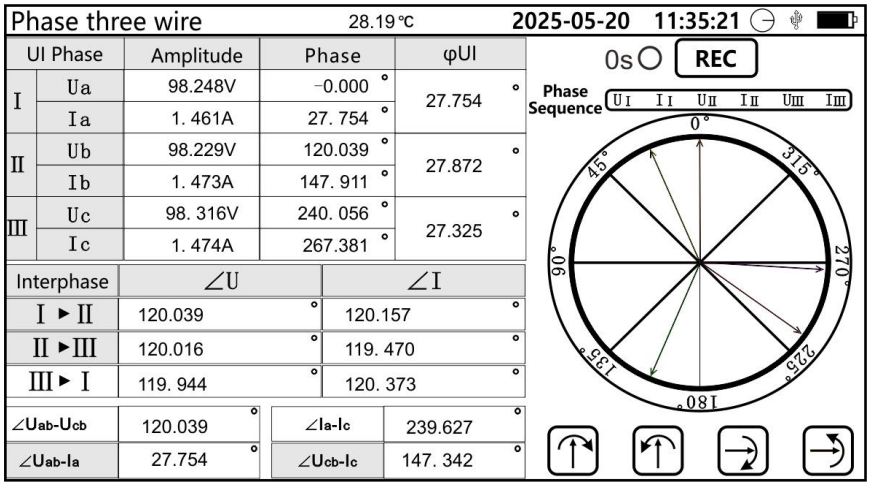


Figure 22 - Phase Measurement - Three-phase Three-wire Test Interface

3) Single-phase wiring

Click Channel 1 to switch channels

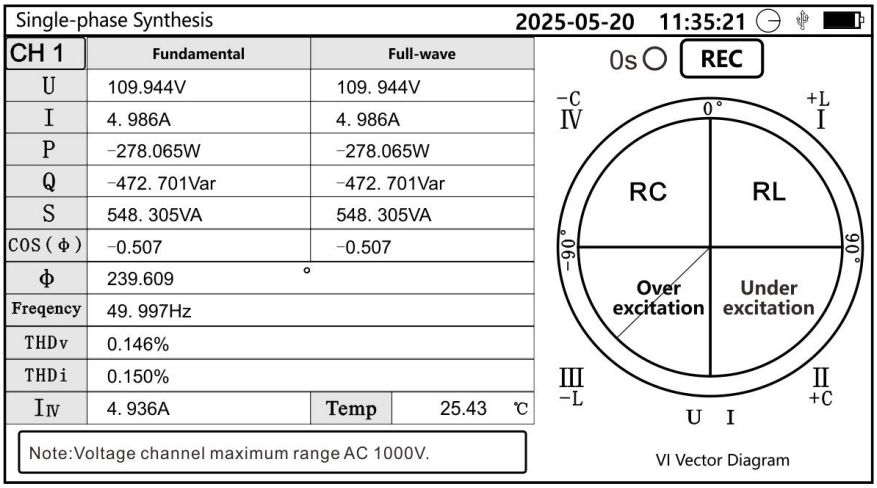


Figure 23 - Phase Measurement - Single-phase Test Interface

10.3. Unbalance

You can record the interface data by clicking "Record" at 1-second intervals.

In three-phase mode, you can select from four angles to display the vector diagram.

1) Three-phase four-wire wiring

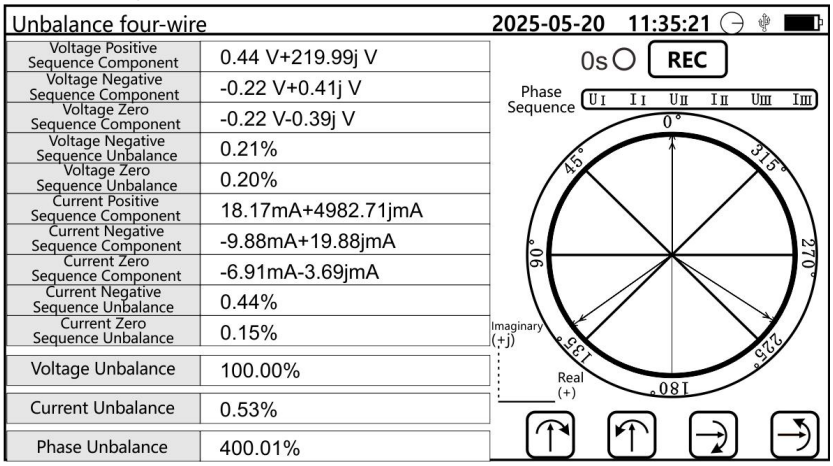


Figure 24 - Unbalance - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

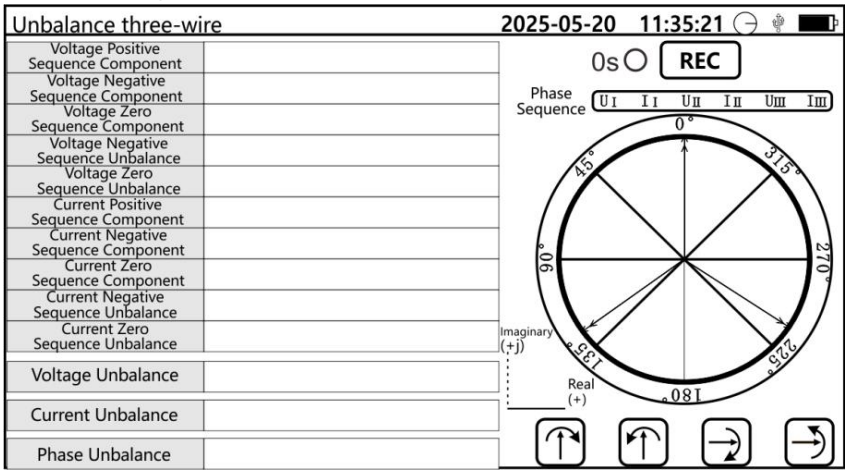


Figure 25 - Unbalance - Three-phase Three-wire Test Interface

3) Single-phase wiring

In single-phase wiring mode, there is no unbalance measurement.

10.4. Harmonic Analysis

You can record the interface data by clicking "Record" at 1-second intervals.

In three-phase mode, you can select three voltage and current channels for bar graph display, and specify one channel to display the harmonic content ratio.In three-phase three-wire mode, U3 harmonic data is not measured. In three-phase three-wire 2CT mode, I2 harmonic data is not measured.

In single-phase mode, you can select one of the three channels for display.

1) Three-phase four-wire wiring

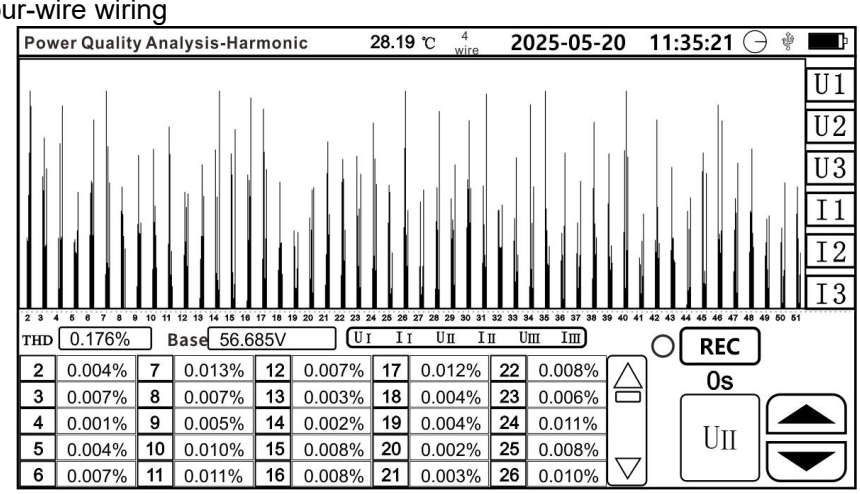
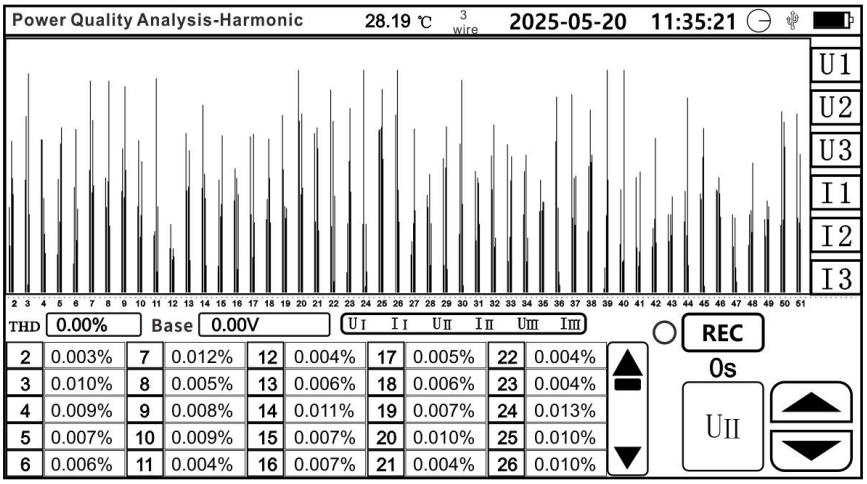


Figure 26 - Harmonic Analysis - Three-phase Four-wire Test Interface

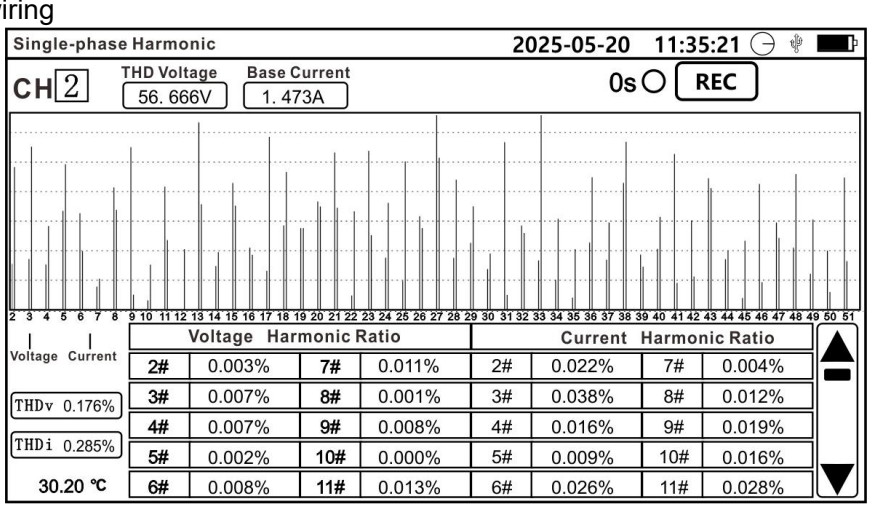
2) Three-phase three-wire wiring



2	0.003%	7	0.012%	12	0.004%	17	0.005%	22	0.004%
3	0.010%	8	0.005%	13	0.006%	18	0.006%	23	0.004%
4	0.009%	9	0.008%	14	0.011%	19	0.007%	24	0.013%
5	0.007%	10	0.009%	15	0.007%	20	0.010%	25	0.010%
6	0.006%	11	0.004%	16	0.007%	21	0.004%	26	0.010%

Figure 27 - Harmonic Analysis - Three-phase Three-wire Test Interface

3) Single-phase wiring



	Voltage Harmonic Ratio				Current Harmonic Ratio			
2#	0.003%	7#	0.011%	2#	0.022%	7#	0.004%
3#	0.007%	8#	0.001%	3#	0.038%	8#	0.012%
4#	0.007%	9#	0.008%	4#	0.016%	9#	0.019%
5#	0.002%	10#	0.000%	5#	0.009%	10#	0.016%
6#	0.008%	11#	0.013%	6#	0.026%	11#	0.028%

Figure 28 - Harmonic Analysis - Single-phase Test Interface

10.5. VI Waveform

You can record the interface data by clicking "Record" at 1-second intervals.

In three-phase mode, you can select three voltage channels and four current channels for waveform display. When Run/Stop is pressed and the light is on, the waveform is held; when the light is off, the waveform is not held.

In three-phase mode, you can modify the Y-axis scale of voltage and current to zoom in or out on the waveform, and modify the time base to control the number of cycles displayed.

In three-phase three-wire mode, the U3 waveform is not displayed. In three-phase three-wire 2CT mode, the I2 waveform is not displayed.

In single-phase mode, you can select one of the channels for waveform display. Click "+" or "-" to zoom in/out and control the number of cycles displayed. Select Hold to choose whether to hold the waveform.

1) Three-phase four-wire wiring

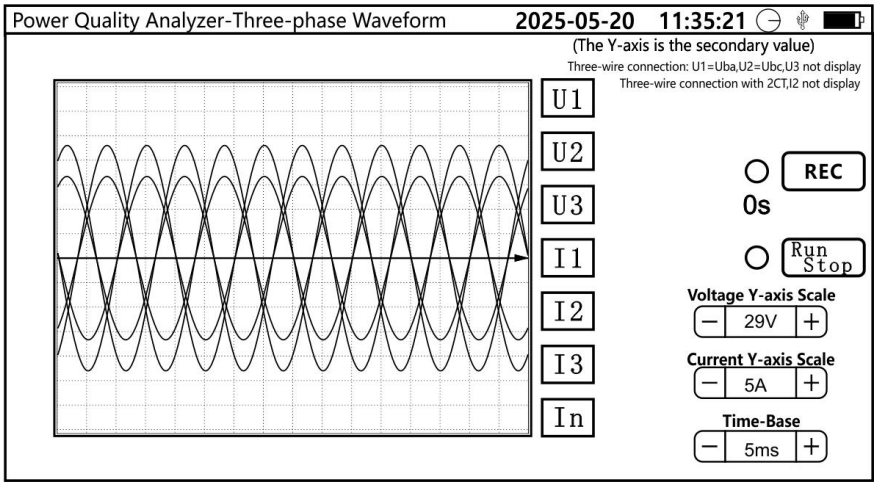


Figure 29 - VI Waveform - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

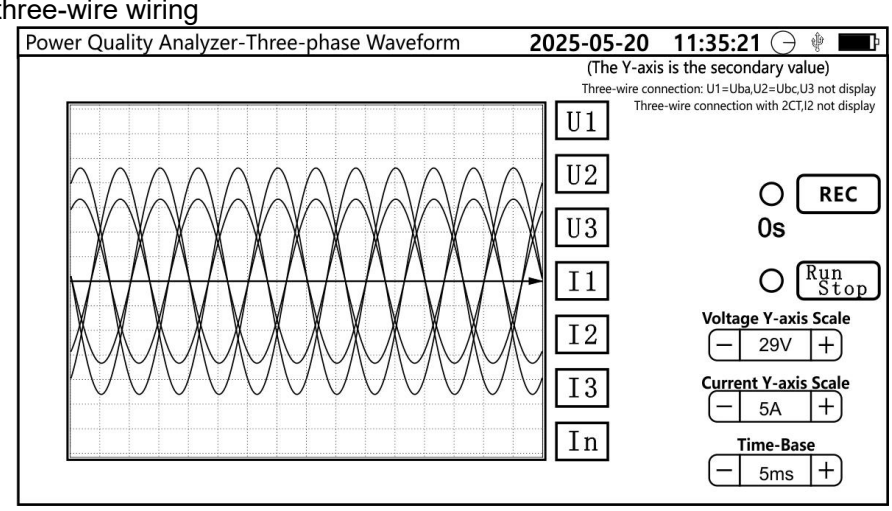


Figure 30 - VI Waveform - Three-phase Three-wire Test Interface

3) Single-phase wiring

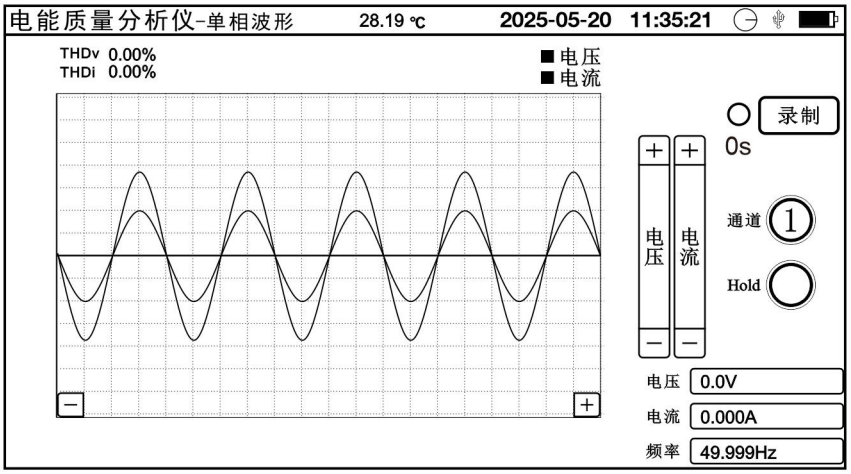


Figure 31 - VI Waveform - Single-phase Test Interface

10.6. VI Trend Graph

You can record the interface data by clicking "Record" at 1-second intervals.
You can change the sampling period by selecting "10T/Sec".
In three-phase mode, you can select three voltage channels and four current channels for display.
In single-phase mode, you can select one of the channels for display.

1) Three-phase four-wire wiring

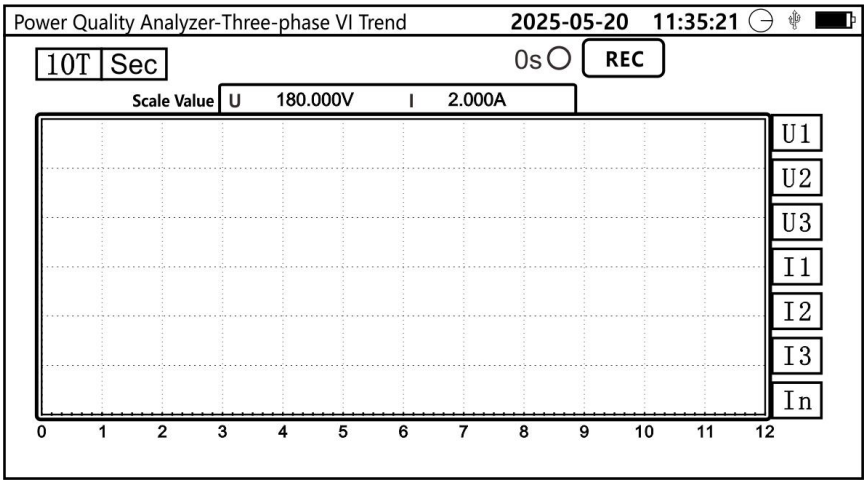


Figure 32 - VI Trend Graph - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

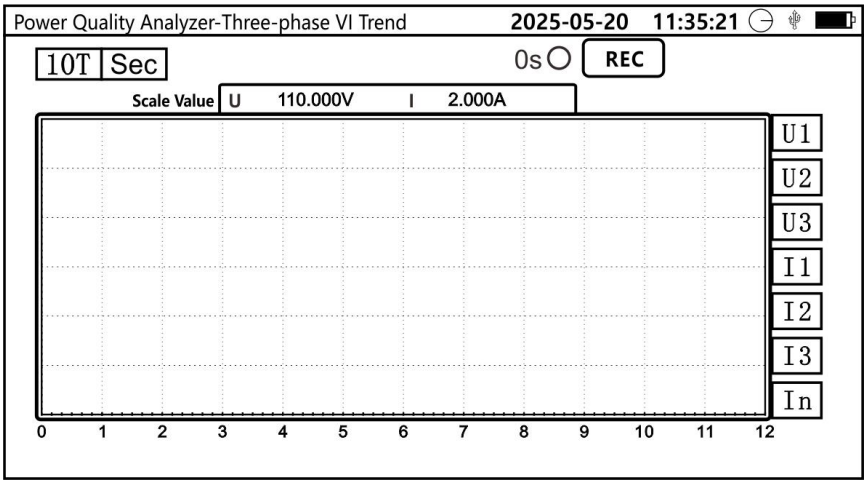


Figure 33 - VI Trend Graph - Three-phase Three-wire Test Interface

3) Single-phase wiring

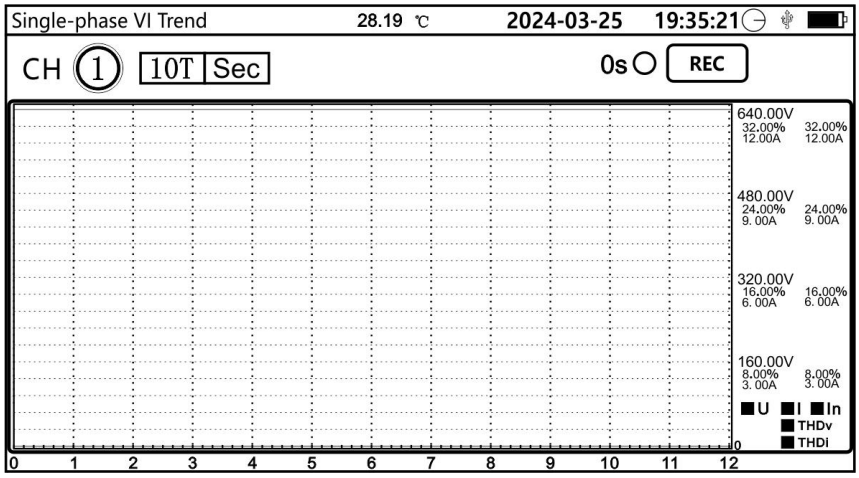


Figure 34 - VI Trend Graph - Single-phase Test Interface

10.7. Power Trend

You can record the interface data by clicking "Record" at 1-second intervals.

Power is not measured in three-phase three-wire mode.

You can change the sampling period by selecting "10T/Sec".

In three-phase four-wire mode, you can select three voltage channels and four current channels for display, and the scale can be zoomed.

In single-phase mode, you can select one of the channels for display, and the scale can be zoomed.

1) Three-phase four-wire wiring

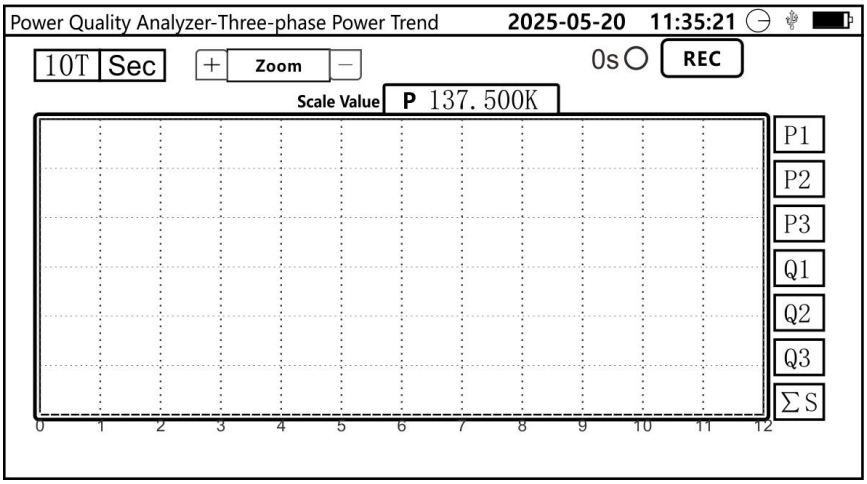


Figure 35 - Power Trend - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

Power is not measured in three-phase three-wire mode.

3) Single-phase wiring

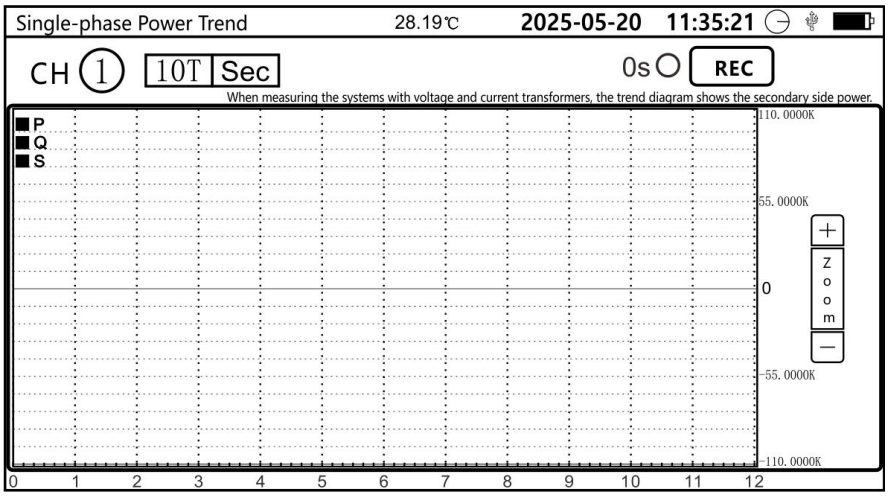


Figure 36 - Power Trend - Single-phase Test Interface

10.8. Event Capture

You can capture by setting the voltage upper/lower limits and current upper limit. When Run/Stop is pressed and the light is on, capture starts. The current input must be within the specified upper/lower limits to start capture; otherwise, a beep sounds. When the Run/Stop light is off, capture stops. When capture is successful, a screenshot is automatically saved.

The Hold button selects whether to hold the waveform.

In three-phase mode, you can change the Y-axis scale of voltage and current to zoom in/out on the waveform. In single-phase mode, you can click "+" or "-" to zoom in/out on the waveform, and also specify any combination of voltage or current for capture.

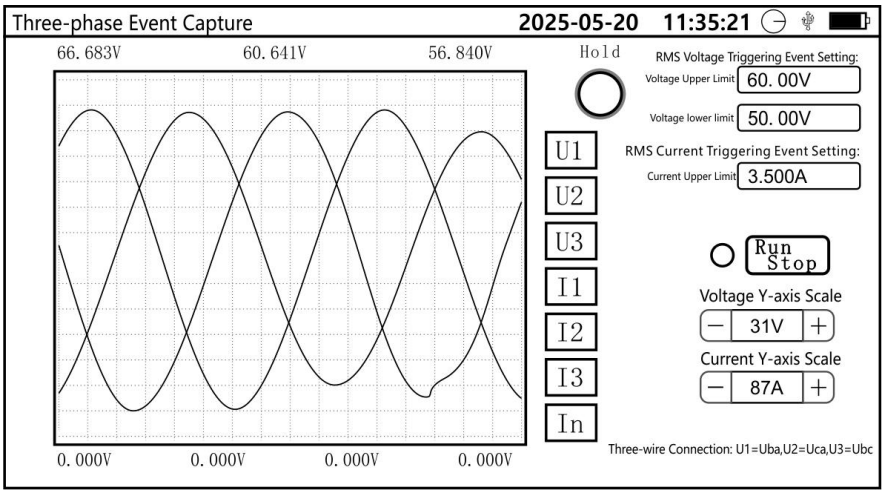


Figure 37 - Event Capture - Three-phase Four-wire Test Interface

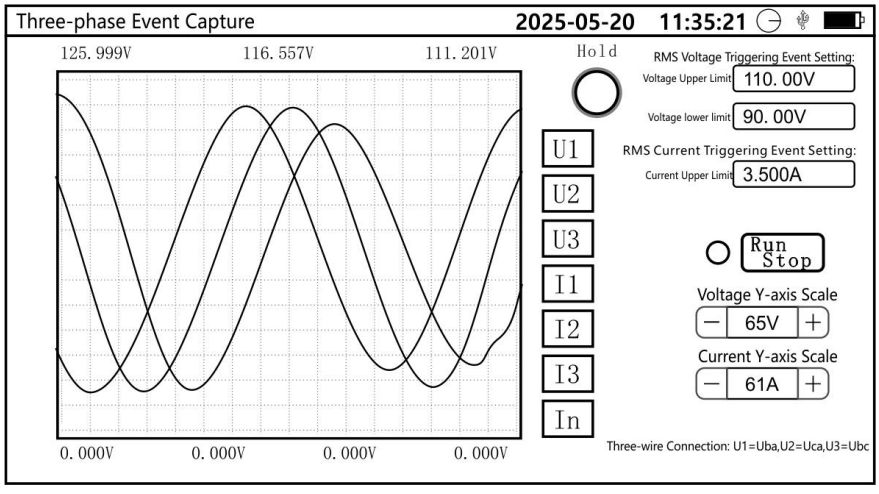


Figure 38 - Event Capture - Three-phase Three-wire Test Interface

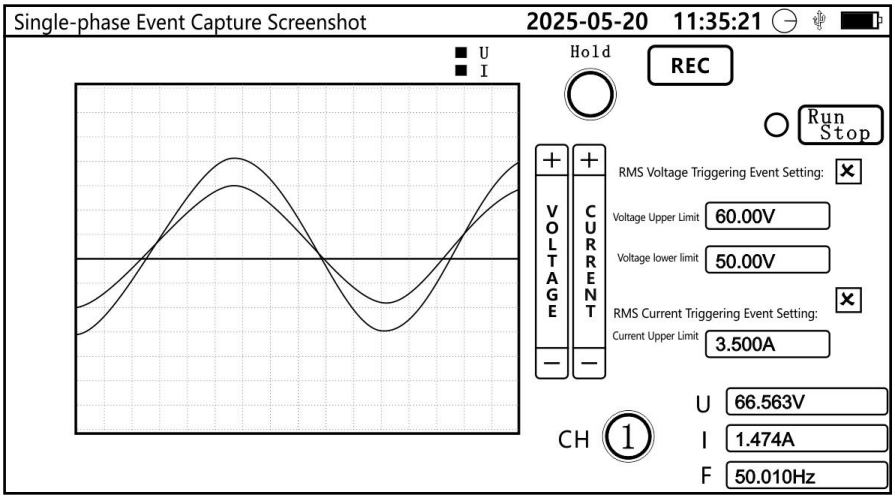


Figure 39 - Event Capture - Single-phase Test Interface

10.9. Energy Calculation

Press the RUN button to start energy calculation. Press again to stop, and a screenshot will be automatically saved once.

1) Three-phase four-wire wiring

Three-phase Electric Energy Calculation 2025-05-20 11:35:21

T F	I	II	III
I	10. 001A	9. 985A	10.005A
U	101. 008V	0. 000V	101. 112V
P	894. 526W	-0.204W	860.662W
Q	471. 244Var	-0. 598Var	-532. 855Var
S	1010. 529VA	0. 612VA	1011. 916VA
WATTh	19.864KWh	-0.010KWh	19.120KWh
VARh	10.475KWh	-0. 019KWh	-11.842KWh
VAh	22.457KWh	0.021KWh	22. 490KWh
COS Φ	0. 885	-0. 333	0. 851
Freqency	49. 997Hz		49. 998Hz
Σ P	1754. 985W	Σ WATTh	38. 974KWh
Σ Q	-62. 209Var	Σ VARh	-1. 386KWh
Σ S	2023. 057VA	Σ VAh	44. 968KWh

Run Stop

Click the upper button to start the power accumulation

Start time:
25-05-20 15:46:47

End time:
25-05-20 15:46:58

Figure 40 - Energy Calculation - Three-phase Four-wire Test Interface

2) Three-phase three-wire wiring

Three-phase Electric Energy Calculation 2025-05-20 11:35:21

T F	I	II	III
I	10. 001A	9. 985A	10.004A
U	101.057V	101. 038V	101. 071V
P			
Q			
S			
WATTh			
VARh			
VAh			
COS Φ			
Freqency	49.998Hz	49.998Hz	49.998Hz
Σ P	1795. 959W	Σ WATTh	111. 782KWh
Σ Q	945.833Var	Σ VARh	125. 199KWh
Σ S	2029.795VA	Σ VAh	167.840KWh

Run Stop

Click the upper button to start the power accumulation

Start time:
25-05-20 16:46:47

End time:
25-05-20 16:46:58

Figure 41 - Energy Calculation - Three-phase Three-wire Test

3) Single-phase wiring

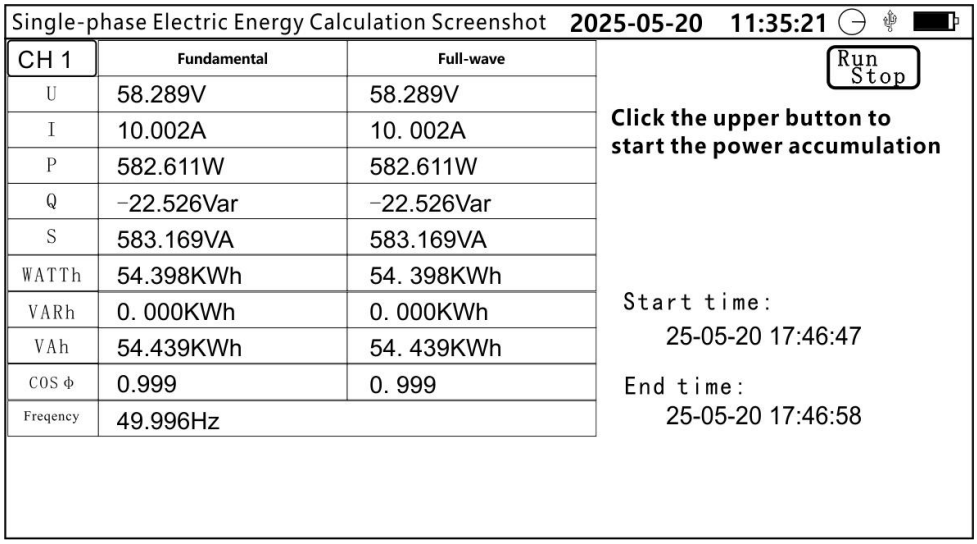


Figure 42 - Energy Calculation - Single-phase Test Interface

10.10. Flicker Test

You can record the interface data by clicking "Record" at 1-second intervals.
In three-phase four-wire mode, you can select three voltage channels for simultaneous display.
In single-phase mode, you can select one of the voltage channels for display.

1) Three-phase four-wire / three-phase three-wire wiring

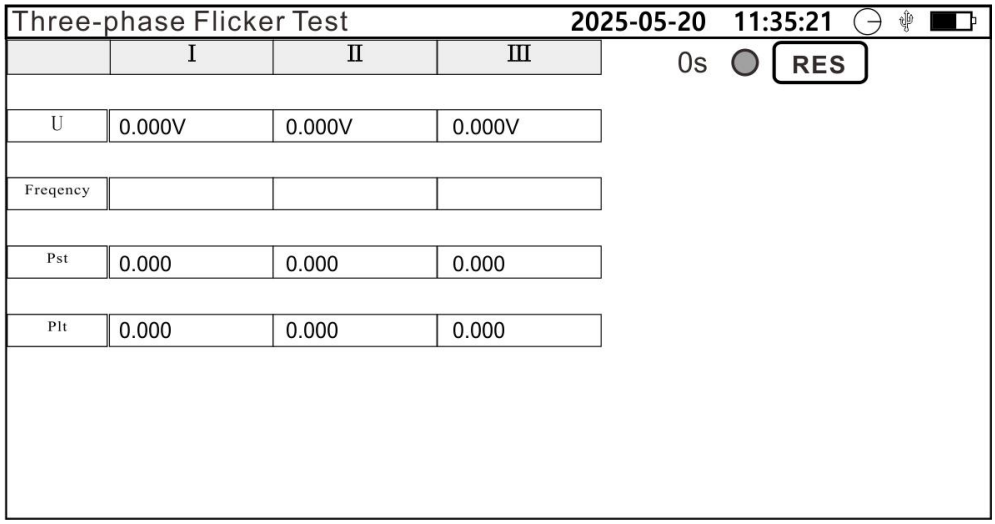


Figure 43 - Flicker Test - Three-phase Four-wire / Three-wire Test Interface

2) Single-phase wiring

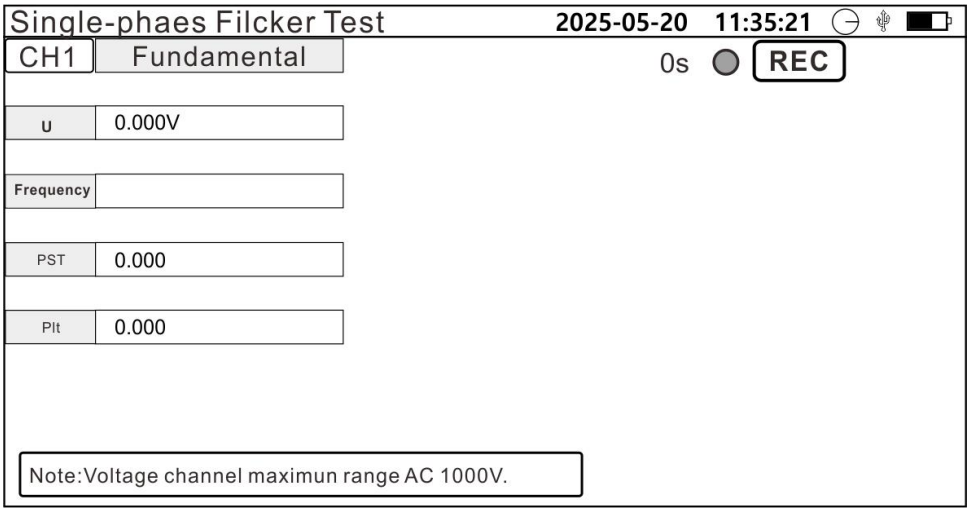


Figure 44 - Flicker Test - Single-phase Test Interface

10.11. DC Test

You can test DC voltage, DC current, and DC power. A DC current clamp is required for DC current measurement.

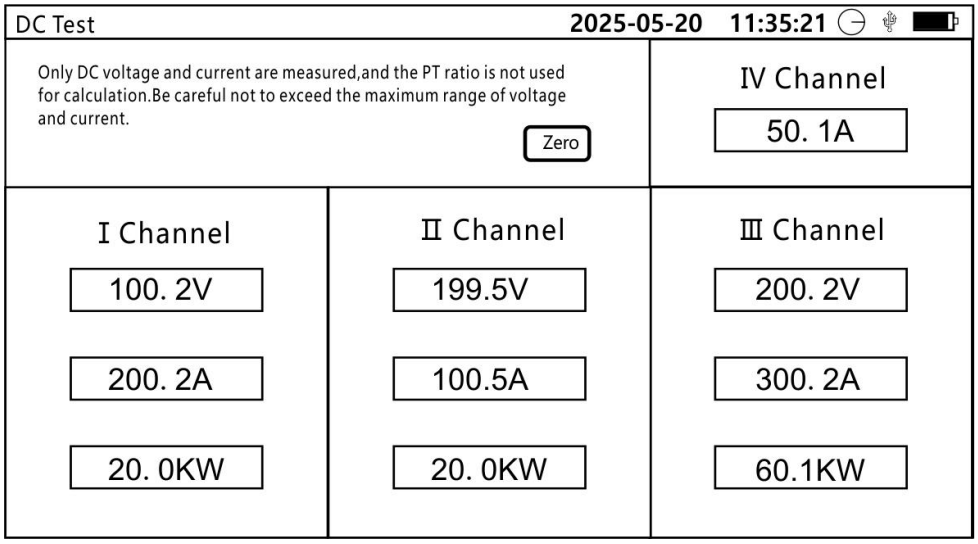


Figure 45 - DC Test Interface

10.12. Ratio Test

The ratio value and polarity are determined by judging the phase and magnitude of I1 current and I2 current.

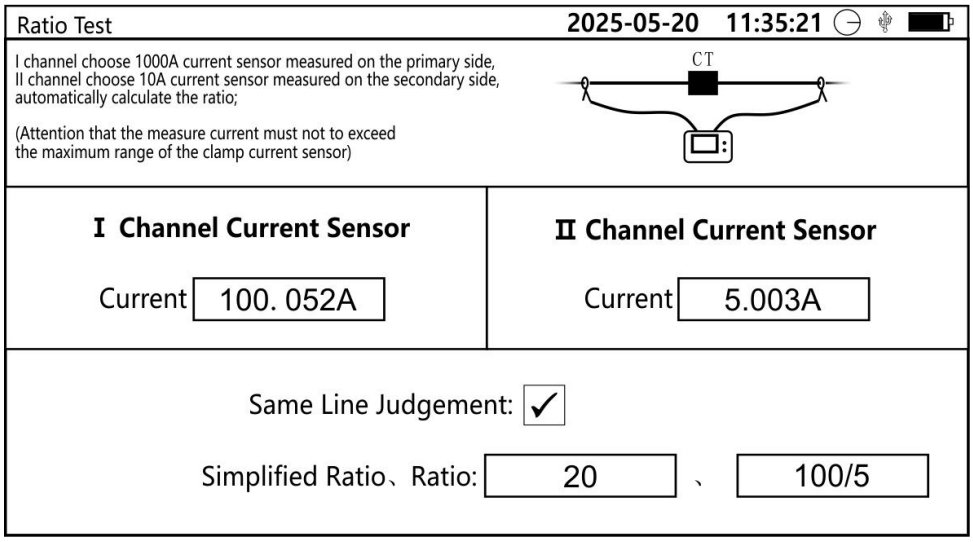


Figure 46 - Ratio Test Interface

11. Recording Playback and Recording Clearing

11.1. Recording Playback

You can select any screen recording or screenshot for playback, and drag to view data during playback.

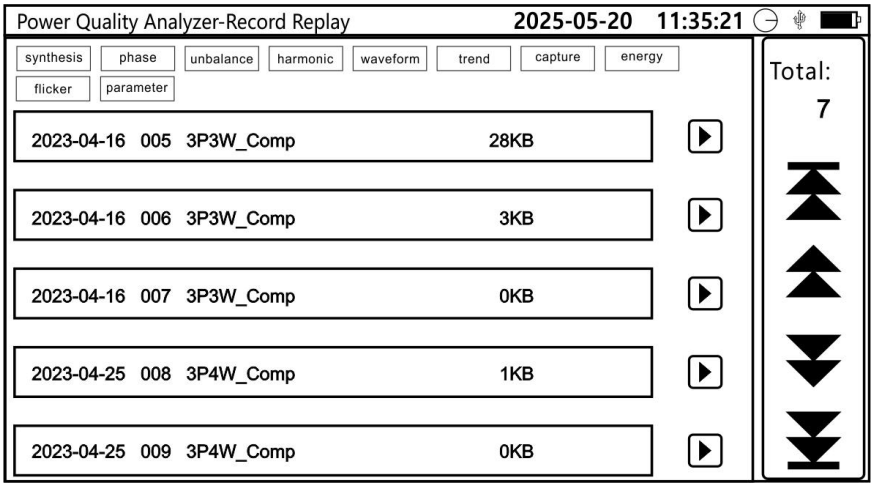


Figure 47 - Recording Playback Interface

11.2. Recording Clearing

You can select one or more screen recordings or screenshots to delete.

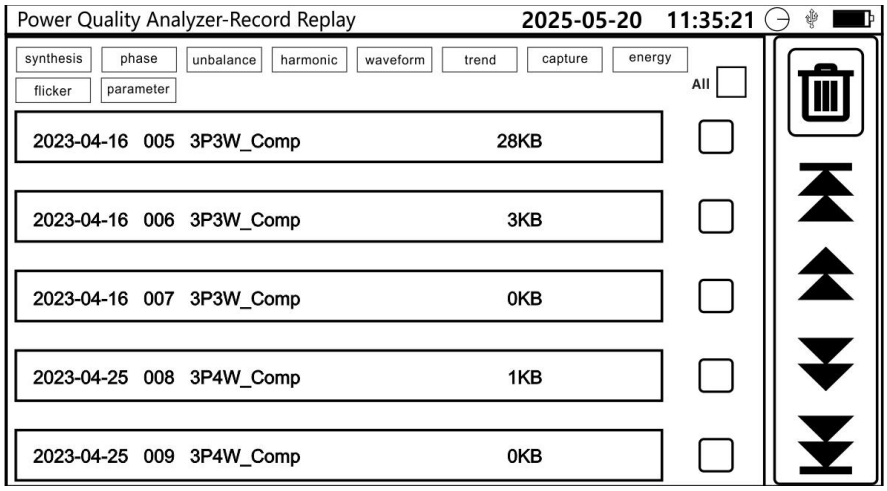


Figure 48 - Recording Clearing

12. Data Upload

Before use, you need to install the USB driver and the upload software for this meter.
You can log in to the official website to download the data upload software for the corresponding model.

13. Overall Specifications

13.1. Operating Range

1) Environmental Conditions

The following table shows the conditions regarding ambient temperature and humidity:

	Temperature Range	Humidity Range
Reference Environmental Conditions	20℃ ~ 26℃	45%RH ~ 75%RH
Operating Range Conditions	0℃ ~ 50℃	10%RH ~ 85%RH
Storage Conditions (with battery)	-20℃ ~ 50℃	0%RH ~ 90%RH
Storage Conditions (without battery)	-20℃ ~ 75℃	0%RH ~ 90%RH

Warning: If the temperature is above 40℃, the instrument should be powered either by battery or by external power supply, but not both simultaneously.

2) Mechanical Conditions

According to IEC61010-1, this instrument is a portable mobile instrument.

- Operating position: Any position.
- Reference operating position: Placed on a horizontal surface.
- Hardness (IEC 61010-1): When the instrument is packed, a force of 30N is applied (at 40℃).
- Drop test (IEC 61010-1): 1m is assumed to be the most severe case. Acceptance criteria for the drop test: No permanent mechanical damage or functional damage.
- Sealing: IP50 according to NF EN60529A1 (electrical IP2X for terminals).

3) EMC Electromagnetic Compatibility

A. Immunity (according to IEC61326-1:2006)

- Electrostatic discharge immunity (IEC61000-4-2):
  Level 1: Intensity: 4KV contact;
  Pass standard: Criteria A.
  Level 2: Intensity: 8KV air discharge;
  Pass standard: Criteria A.
- Radiated immunity (according to IEC61000-4-3 and IEC61000-4-8):
  Intensity: 10V.m^-1^;
  Pass standard: Criteria B.

- Fast transient burst immunity (IEC61000-4-4):
  Intensity: 2KV for voltage input and power supply; 1KV for current input.
  Pass standard: Criteria A.
- Surge immunity (IEC61000-4-5):
  Intensity: 2KV differential mode for voltage input; 1KV common mode for voltage input.
  Pass standard: Criteria A.
- RF immunity (according to IEC61000-4-6):
  Intensity: 3V for voltage input and power supply;
  Pass standard: Criteria A.
- Voltage dips/interruptions (according to IEC61000-4-11):
  Intensity: 100% loss for more than one cycle;
  Pass standard: Criteria A.

B. Emission (according to NF EN61326-1:2006)

- Class A instrument.

13.2. Safety in Use

- Application complies with IEC61010-1 safety regulations.
  (Voltage input ports are isolated by protective impedance.)
- Pollution degree: 2.
- Double insulation between port and ground.
- Double insulation between voltage input terminals, power supply, and other I/O ports.
- Indoor use.

13.3. Power and Energy Quadrant Diagram

This diagram serves as a reference for power and energy W measurement.

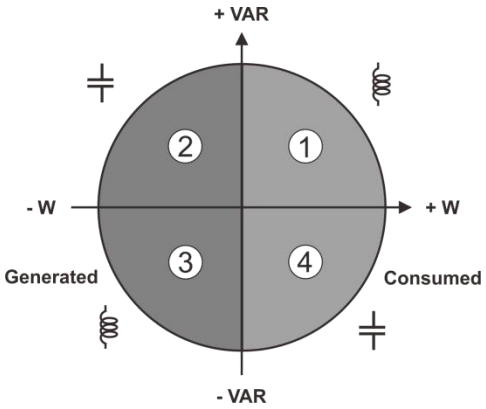


Figure 49 - Power and Energy Quadrant Diagram

14. Maintenance and Care

14.1. Use of Current Clamps

1) The current clamps of each meter are dedicated to that specific meter and cannot be used on another meter. Furthermore, each current clamp must correspond one-to-one with I1, I2, I3 on the meter. Do not connect incorrectly; otherwise, measurement accuracy will be affected.
2) Prevent the current clamps from being dropped or knocked. The jaw must be kept clean, and the test is reliable only when it is completely closed.
3) After using the current clamps, promptly remove dust from the jaw surface. Do not use rough materials or corrosive agents to clean the jaw surface. It is best to wipe gently with a soft cloth and a lubricant (e.g., WD-40). Also clean the jaws before testing.

14.2. Precautions for Instrument Use

1) This instrument is only for secondary circuit and low-voltage circuit testing. Do not use it to measure current in high-voltage lines to prevent electric shock.
2) When the instrument is connected to an external AC power supply using the dedicated adapter, it will automatically charge the internal rechargeable battery.

15. Packing List

No.	Description	Qty
1	Instrument host	1 set
2	008B Current Clamp (Optional)	4 pcs
3	032B Current Clamp (Optional)	4 pcs
4	050B Current Clamp (Optional)	4 pcs
5	300FA Current Clamp (Optional)	4 pcs
6	035AD Current Clamp (Optional)	4 pcs
7	Pen Probe Test Lead (yellow, green, red, black each 1 pc, length 3m)	4 pcs
8	Alligator Clip	4 pcs
9	Power Adapter (DC 12V)	1 pc
10	USB Data Cable	1 pc
11	8G Memory Card (inserted in the instrument)	1 pc
12	User Manual, Warranty Card / Certificate of Quality	1 copy

The company is not responsible for other losses caused by use.
The contents of this user manual cannot be used as a reason to use the product for special purposes.
The rights to change specifications or designs described in this manual without notice and without obligations.