

EAGLOTEST

S510

POWER QUALITY ANALYZER



USER MANUAL

CATALOG

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SECTION 1

Safety Warnings

Thank you for purchasing S510 Power Quality Analyzer! Before using the models, please carefully read the user manual and strictly follow the instruction.

——Illegal use of the instrument may result in electric shock, explosion, or fire.

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

Pay attention to the text and icons on the panel and back panel of the instrument.

- Only authorized personnel can operate, disassemble, calibrate the instrument, and conduct periodic maintenance.
- Stop using the instrument immediately in case of any danger will be caused by continuing to use it. Please securely pack the equipment and send it to an authorized organization for disposal.
- The user must follow the danger sign  to conduct a safe operation.
- The user must follow the extreme danger sign “” to conduct a safe operation.
- Connect the current clamp to the meter correspondingly, otherwise, the test error may increase.
- The establishment and operator of the system are responsible for system security issues not related to this instrument.
- For safety considerations, please only use the wires and accessories that come with the device in compliance with IEC61010-031(2002) standard.

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When connect a low voltage level sensor or accessory to the equipment, it must be suitable for the system.

- Check whether test leads, current clamps, and accessories are in optimum condition before use. If there is insulation damage, even only partial damage for leads, current clamps, or accessories, it must be repaired or scrapped.
- Comply with the environmental conditions to use and store the instrument.
- Use personal safety equipment if circumstances require.
- Use the instrument for IV equipment, in compliance with IEC61010 -1 standard, with AC/DC voltage to ground not greater than 600V, or for III equipment with voltage not greater than 1000V. It is prohibited to use for higher voltage networks or equipment.
- Use only the power adapter or battery pack provided by Eaglotest with a specific safety rating.
- Follow the safety level restrictions of accessories or current clamps and avoid connecting to unused terminals.
- Do not install or remove certain current clamps from exposed conductors at hazardous voltages.

Usage and connection steps:

- Turn on the instrument.
- Set the instrument-related parameters according to the desired results and with reference to the network type.
- Connect the voltage test leads and current clamp to the instrument.

SECTION 1

- Connect the ground and/or neutral voltage test leads to the ground and/or neutral of the grid.
- Clamp the neutral corresponding current clamp to the neutral wire of the grid.
- Connect the conductor of phase L1 to the grid phase L1 and the corresponding current clamp to clamp the grid phase L1.
- Repeat the above L1 connection procedure for L2 and L3.

Note: Following this procedure will reduce the chance of connection errors and avoid wasting time.

Disconnect step:

- Disconnect the connections in reverse order (usually the ground or neutral wire is disconnected last).
- Unplug the instrument leads and turn off the power.
- Charge the battery and upload the data recorded during the test, if necessary.
- USB is used for data transfer and the battery can be charged by the supplied dedicated adapter.

The eponymous end of the current clamp:

- The current clamp is marked with an arrow, and the side whose direction is the input is the current homogenization input, i.e., the homogenization end.
- S-008 current clamp is marked with an arrow, and the direction of the arrow is the side of the input that is the same direction as the current input, i.e., the same name end.

SECTION 1

- S-070, S-105, S-150 current clamps are marked with a red arrow, and the direction of the arrow is that the input side is the same direction as the current input, i.e., the same name end.
- S-100JF, S-200JF, S-300JF flexible coil current sensors are marked with a black arrow, and the direction of the arrow is that the side of the input is the same direction as the current input, i.e., the same name terminal.

SECTION 2

Introduction

The Power Quality Analyzer is a multifunctional and intelligent three-phase testing instrument designed for on-site power analysis. It features user-friendly operation, a high-resolution color LCD, and a rugged, vibration-resistant enclosure.

It simultaneously measures four channels of voltage and current, providing real-time readings of active, reactive, and apparent power, energy, power factor, harmonics (THD/THF), and three-phase unbalance. The analyzer supports transient capture, inrush current monitoring, and trend recording, offering comprehensive evaluation of power quality and system stability.

Equipped with a **DSP + ARM dual-processor architecture**, it achieves 1 MSPS sampling rate with dual ADCs, ensuring precise detection of transient events such as voltage sags, swells, and interruptions.

Data storage includes 60 screenshots, 150 transient waveforms, and **12,800 alarm logs**, with up to 960 days of continuous trend recording for 20 parameters.

Applications include power utilities, petrochemical, metallurgy, railways, and industrial facilities, providing efficient, accurate diagnostics and long-term monitoring of voltage, current, and power quality parameters.

SECTION 2

Functions:

- Basic Functions
- Real-time waveform display (4 voltage / 4 current channels)
- True RMS of voltage and current
- DC component of voltage
- Peak values of voltage and current
- Maximum/minimum RMS values per half-cycle
- Phasor diagram display
- Harmonic measurement up to the 50th order
- Bar graph display of harmonic content for each phase voltage and current
- Total Harmonic Distortion (THD)
- Telephone Harmonic Factor (THF)
- Active / reactive / apparent power per phase and total
- Active / reactive / apparent energy per phase and total
- Transformer K-Factor
- Power factor (PF) and displacement power factor (DPF, $\cos\phi$)
- Short-term voltage flicker (Pst)
- Three-phase voltage and current unbalance
- CT ratio setting

Capture and Recording Functions

Transient Capture:

Detects and records instantaneous changes in grid voltage and current, including voltage/current fluctuations, swells, sags, short interruptions, transient overvoltage, inrush current, and waveform distortion. Up to **150 sets** of transient waveforms can be stored.

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Inrush Current Monitoring:

Monitors surge current and startup current during equipment energization, aiding proper capacity design. Displays RMS rise/fall curves, inrush current envelope, and four-channel voltage/current waveforms. After triggering, it can record approximately **100 seconds** of instantaneous data per cycle.

Trend Recording:

Records and graphs up to **123 parameters**, including:

Urms, Uthd, Ucf, Uunb, Hz, Vrms, Vthd, Vcf, Vunb, Pst, Arms, Athd, Acf, Aunb, KF, W, VAR, VA, PF, $\cos\phi$, $\tan\phi$, and 50th-order harmonics of voltage and current. Up to **20 parameters** can be selected for recording at **1-second intervals**, with a total duration of about **960 days**.

Alarm Function:

Users can set limits for selected parameters. When a value exceeds its threshold, the instrument records an alarm log. Example alarms include overvoltage, overcurrent, excessive unbalance, harmonic order over-limit, frequency deviation, active power over-limit, or excessive THD. Up to **40 groups** of alarm parameters can be configured, each with independent thresholds (including 123 measurable parameters) and minimum duration settings. A total of **12,800 alarm records** can be stored.

Screenshot Function:

Screenshots can be captured on any test page, automatically saving the image with timestamp and mode information. Up to **60 screenshots** can be saved.

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Specification

3.1 Working Requirement

Factor	Test Items	Standard Requirement	Working Condition
Ambient Temperature	all parameters	$(23\pm 2)^{\circ}\text{C}$	$-10^{\circ}\text{C} \sim 40^{\circ}\text{C}$
Relative Humidity	all parameters	40% ~ 60%	<80%
Phase Voltage	all parameters	$(100\pm 1\%)V$	1.0V ~ 1000V
Line Voltage	RMS Line Voltage	$(200\pm 1\%)V$	1.0V ~ 2000V
Current	RMS Current	$(5\pm 1\%)A$	10mA ~ 9000A
Grid Frequency	all parameters	$50\text{Hz}\pm 0.1\text{Hz}$	40Hz ~ 70Hz
Phase Shift	Active Power Active Energy	$\text{Cos}\phi=1$	$\text{Cos}\phi:0.2 \sim 1.0$
	reactive power and reactive energy	$\text{Sin}\phi=1$	$\text{Sin}\phi:0.2 \sim 1.0$
Harmonic	all	<0.1%	0.0% ~ 100%

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	parameters		
Voltage Unbalance	all parameters	<10%	0.0% ~ 100%
Instrument Working Voltage	all parameters	DC11.1V±0.1V	DC10.5V ~ 12.6V
External Electric Field, Magnetic Field	all parameters	should be avoided	
Test wire position	parameters related to current	The measured wire is in the approximate geometric center of the jaws	

3.2 Specification

Power	11.1V 7800mAh rechargeable Lithium-ion Battery
Battery Level Indicator	When the battery power is too low, it will automatically shut down after 1 minute.
Power Consumption	The current consumption is 410mA, and the battery can work continuously for about 15 hours when fully charged.
Display Mode	LCD, 640dots×480dots, 5.6 inches, display area:116mm×88mm
Jaw size	S-008 Current Clamp: 7.5mm×13mm (Optional) S-070 Current Clamp: Φ70mm (Optional) S-105 Current Clamp: Φ105mm (Optional)

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	S-150 Current Clamp: $\Phi 150\text{mm}$ (Optional) S-100JF Rogowski Coil: $\Phi 100\text{mm}$ (Optional) S-200JF Rogowski Coil: $\Phi 200\text{mm}$ (Standard) S-300JF Rogowski Coil: $\Phi 300\text{mm}$ (Optional)
Instrument Size	L:182mm×W:68mm×H:275mm
Number of Channels	4U/4I
Line Voltage	1.0V ~ 2000V
Phase Voltage	1.0V ~ 1000V
Current	S-008 Current Clamp: 10mA ~ 10.0A; S-070 Current Clamp: 0.10A ~ 100A; S-105 Current Clamp: 1.0A ~ 200A; S-150 Current Clamp: 10.0A~600A; S-200JF Rogowski Coil: 5A ~ 100A, 50A~1000A, 100A~9000A
Frequency	40Hz ~ 70Hz
CT Turn Ratio	✓
Parameters of electricity	W, VA, Var, PF, DPF, $\cos\phi$, $\tan\phi$
Energy Parameters	Wh, Varh, Vah
Harmonic	50
Total Harmonic distortion	1 ~ 50, each phase

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Expert Mode	✓
Number of Transient Record	150 Sets
Voltage Flicker	✓
Starting Current	100 Seconds
Three Phase Unbalance	✓
Record	960 days, record 20 parameters at the same time, record 1 point every 1 second
Min/Max	✓
Alarm	40 different types of parameter selections, 12,800 sets alarm logs
Peak Value	✓
Screenshot Capacity	60
Menu Language	Chinese and English
USB interface	✓
Automatic shut-down	In alarm/trend graph record/start current detection/transient capture/online power and energy mode, the instrument will not automatically shut down.

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	In other test modes, if it is not in the test state or there is no key operation for 15 minutes, it will automatically shut down after 1 minute.
Backlight	Suitable for dark places and night use
Instrument Weight	Instrument weight: appro 1.6kg including battery
	S-008 Current Clamp: appro 170g×4; (Optional)
	S-070 Current Clamp: appro 556g×4; (Optional)
	S-105 Current Clamp: appro 558g×4; (Optional)
	S-150 Current Clamp: appro 1.2kg×4; (Optional)
	S-100JF Rogowski Coil: appro 303g×4, including battery;(Optional)
	S-200JF Rogowski Coil: appro 325g×4, including battery;(Standard)
	S-300JF Rogowski Coil: appro 348g×4, including battery;(Optional)
	Test leads and power adapter: appro 900g; Total Weight: appro 15kg, including outer packing
Voltage Test Line Length	3m
Current Clamp Line length	2m
Working Temperature and Humidity	-10℃ ~ 40℃ ; below 80%Rh

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Storage Temperature and Humidity	-10℃ ~ 60℃ ; below 70%Rh
Input Resistance	1MΩ
Withstand Voltage	The sine wave AC voltage of 3700V/50Hz between the instrument line and housing lasts for 1 minute.
Insulation	Insulation between the instrument line and the sheath $\geq 10\text{M}\Omega$
Structure	Double insulation with insulating and vibration-proof sheath
Safety Regulation	IEC 61010 1000V Cat III / 600V CAT IV , IEC61010-031, IEC61326, Pollution Level 2

3.3 Instrument Accuracy (excluding current clamp)

The data below are presented is based on the ideal current sensor, perfectly linear without phase shift.

Measurement	Measurement Range	Resolution	Tolerance
Frequency	40Hz ~ 70Hz	0.01Hz	$\pm(0.03)\text{Hz}$
True RMS Voltage	1.0V ~ 1000V	0.1V	$\pm(0.5\%+5\text{dgt})$
True RMS Line Voltage	1.0V ~ 2000V	0.1V	$\pm(0.5\%+5\text{dgt})$

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DC Voltage	1.0V ~ 1000V	0.1V	$\pm(1.0\%+5\text{dgt})$
True RMS Current	10mA ~ 9000A	1mA	$\pm(0.5\%+5\text{dgt})$
Phase Voltage Peak	1.0V ~ 1414V	0.1V	$\pm(1.0\%+5\text{dgt})$
Neutral Line voltage Peak	1.0V ~ 2828V	0.1V	$\pm(1.0\%+5\text{dgt})$
Current Peak	10mA ~ 12727A	1mA	$\pm(1.0\%+5\text{dgt})$
CF	1.00 ~ 3.99	0.01	$\pm(1\%+2\text{dgt})$
	4.00 ~ 9.99	0.01	$\pm(5\%+2\text{dgt})$
Active Power	0.000W ~ 9000.0kW	0.001W	$\pm(1\%+3\text{dgt})$ $\text{Cos}\phi \geq 0.8$
			$\pm(1.5\%+10\text{dgt})$ $0.2 \leq \text{Cos}\phi < 0.8$
Reactive Power, inductive or capacitive	0.000VAR ~ 9000.0kVAR	0.001VAR	$\pm(1\%+3\text{dgt})$ $\text{Sin}\phi \geq 0.5$
			$\pm(1.5\%+10\text{dgt})$ $0.2 \leq \text{Sin}\phi < 0.5$
Apparent Power	0.000VA ~ 9000.0kVA	0.001VA	$\pm(1\%+3\text{dgt})$
Power Factor	-1.000 ~ 1.000	0.001	$\pm(1.5\%+3\text{dgt})$ $\text{Cos}\phi \geq 0.5$
			$\pm(1.5\%+10\text{dgt})$

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			$0.2 \leq \cos\phi < 0.5$
Active Electrical Energy	0.000Wh ~ 9000.0MWh	0.001Wh	$\pm(1\%+3\text{dgt})$ $\cos\phi \geq 0.8$
			$\pm(1.5\%+10\text{dgt})$ $0.2 \leq \cos\phi < 0.8$
Reactive Electrical Energy, Inductive or Capacitive	0.000VARh ~ 9000.0MVARh	0.001VARh	$\pm(1\%+3\text{dgt})$ $\sin\phi \geq 0.5$
			$\pm(1.5\%+10\text{dgt})$ $0.2 \leq \sin\phi < 0.5$
Apparent Electrical Energy	0.000VAh ~ 9000.0MVAh	0.001VAh	$\pm(1\%+3\text{dgt})$
Phase Angle	$-179^\circ \sim 180^\circ$	1°	$\pm(2^\circ)$
Tanϕ (VA$\geq$50VA)	$-32.76 \sim 32.76$	0.001	$\phi: \pm(1^\circ)$
DPF	$-1.000 \sim 1.000$	0.001	$\phi: \pm(1^\circ)$
Harmonic Ratio 1 ~ 50 (Vrms$>$50V)	0.0% ~ 99.9%	0.1%	$\pm(1\%+5\text{dgt})$
Harmonic Angle (Vrms$>$50V)	$-179^\circ \sim 180^\circ$	1°	$\pm(3^\circ)$ Harmonic order 1 to 25
			$\pm(10^\circ)$ Harmonic order 26 to 50

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Total Harmonic Ratio (THD or THD-F) ≤ 50	0.0% ~ 99.9%	0.1%	±(1%+5dgt)
(THF)	0.0% ~ 99.9%	0.1%	±(1%+5dgt)
Distortion Factor (DF or THD-R) ≤ 50	0.0% ~ 99.9%	0.1%	±(1%+10dgt)
Transformer K Factor	1.00 ~ 99.99	0.01	±(5%)
3 Phase Unbalance	0.0% ~ 100%	0.1%	±(1%)

3.4 Current Sensors

Current Clamp	True RMS Current	Max Tolerance of True RMS Current	Max Tolerance of Phase Angle ϕ
S-008	10mA ~ 99mA	±(1%+3dgt)	±(1.5°), Arms ≥ 20mA
	100mA ~ 10.0A	±(1%+3dgt)	±(1°)
S-070	0.10A ~ 0.99A	±(1%+3dgt)	±(1.5°)
	1.00A ~ 100A	±(1%+3dgt)	±(1°)

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S-105	1.0A ~ 9.9A	$\pm(2\%+3\text{dgt})$	$\pm(3^\circ)$
	10.0A ~ 200A	$\pm(2\%+3\text{dgt})$	$\pm(2^\circ)$
S-150	10.0A ~ 600A	$\pm(2\%+3\text{dgt})$	$\pm(2^\circ)$
S-100JF,S-200JF,S-30 0JF Rogowski Coil	5A ~ 100A	$\pm(1\%+3\text{dgt})$	$\pm(3^\circ)$
	50A ~ 1000A	$\pm(1\%+3\text{dgt})$	$\pm(2^\circ)$
	100A ~ 9000A	$\pm(1\%+3\text{dgt})$	$\pm(2^\circ)$

Note:

Connect the current clamp and meter correspondingly, and do not reverse.

SECTION 4

Instrument Interface

4.1 Introduction



4.2 ON/OFF Key

The instrument can be powered by a rechargeable battery or by a dedicated power adapter.

If the instrument is in the process of **Trend Graph Record**, **Transient Capture**, or **Alarm Detection**, it needs to be confirmed before shutdown.

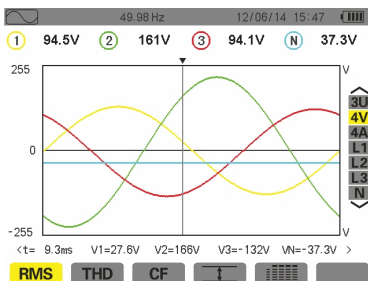
SECTION 4

4.3 LCD Display

4.3.1 Introduction

The Backlight LCD displays the measured value and its graph, instrument parameters, selected curve, instantaneous signal value, and measurement type.

It will automatically display the waveform mode when switching on the instrument.



****Automatic shutdown****

when the instrument is not in any state of Real-time Power and Energy mode, Trend Graph Record, Transient Capture, Inrush Current Detection, or Alarm detection, or is not under voltage or current test, it will automatically shut down if there is no operation within 15 minutes.

4.3.2 Symbolic

Icon Meaning	Icon Meaning
V Phase voltage	 Display voltage and current

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	RMS values and their polar values
U Wire voltage	 Simultaneous display of all voltage and current measurements
A Electric current	 Display voltage and current vector diagrams
VA Apparent power	 Display of power consumption
 Zoom in	 Showing the generation of electrical energy
 Downsize	 Show help first screen
▼ X-axis cursor indication of waveforms, etc.	 Display help second screen
PF... Displays PF, DPF and Tan values.	 Display Help Screen 3
W... Display of power and energy values	 Trend chart model group 1 monitoring parameters
 Start recording	 Trend chart model group 2 monitoring parameters
 Record list	 Trend chart model group 3 monitoring parameters
OK. Confirmation	 Trend chart model group 4 monitoring parameters
 Cessation	 Show previous screen
 Removing	 Display Back Screen

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4.4 Button

4.4.1 Function Button



To choose the required function showed in the bottom bar of the LCD screen.

4.4.2 Cursor Control



key: increasing the value or moving upward;



key: decreasing the

value or moving downward.



key: entering the next interface or moving right;



key: entering the

previous interface or moving left.



key: confirm;



key: return.

4.4.3 Test Mode



key: **waveform mode**, displaying voltage and current waveform,

maximum and minimum values, peak values, a list of measured values of each parameter, and current&voltage vector graphics.



key: **harmonics mode**, displaying the harmonic ratio of voltage, current,

and apparent power in bar graphs, the effective value of harmonics, and the phase shift.



key: **Online Power and Electric Energy Mode**: displaying the measured

active power, reactive power, apparent power and electric energy of each

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phase, power factor, displacement power factor, etc. It will not automatically shut, and can accumulate electric energy for a long time.



key: **Power and Electric Energy Mode**: display the measured active power, reactive power, apparent power and electric energy, power factor of each phase, displacement power factor, etc.



key: **Trend Graph Recording Mode**: the user can record the test value of the selected parameter and save it, after recording, it can display the trend graph of the corresponding measurement parameter.



key: **Alarm Mode**: The alarm log list can monitor the abnormal state of the power grid, Vrms, Arms, half-cycle instantaneous disconnection of Urms, overload, etc., to detect the quality of each parameter of the power grid.



key: **Capture Mode**: detecting the characteristic waveforms of instantaneous changes in voltage and current during power grid operation, such as sudden rises, dips, short-term interruptions, transient over-voltages, and abnormal changes in frequency. It can monitor the inrush current of the motor and record the details of the starting process for every waveform.

4.4.4 Other Button



key: **current ambient temperature**.



key: **pause measurement** and display current value.



key: **online ratio of four currents**.

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key: **set Instrument and capture mode parameters**, including the

instrument time, display, test wiring mode, voltage ratio, current clamp selection, the thresholds of alarm and transient capture, and the measurement parameters of the trend graph recording.



key: **screenshot** the waveforms, harmonics or any other measurement in real-time.



key: **display help information** for the current test mode or page.



key: **enter time setting menu**.



key: **enter the backlight and contrast menu**.

4.5 Wiring Connection

4.5.1 Connector port

The wire connection interface is located on the top of the instrument, and the interface distribution is as follows:

Five voltage
ports: L1, L2, L3,
GND, N

Four current
clamp ports:



Adapter
and
Charger
Port

SECTION 4

Disconnect steps:

- Disconnect in reverse order. The ground or neutral wire is disconnected last.
- Unplug the instrument lead and switch it off.
- Charge the battery and upload the recorded data during the test if necessary.
- USB is used for data transmission, and the battery can be charged by a dedicated adapter.

Dotted Terminal of current clamp:

There is an arrow mark on the current clamp, and the direction of the arrow is the input direction of the current, that is the dotted terminal of the current clamp.

Follow the arrow marked on the current clamp, S-008, S-070, S-105, S-150, and S-200JF to determine the dotted terminal.

4.5.2 Charging interface and USB interface

Use the special power adapter and USB data cable attached to the product.

4.6 Power

4.6.1 Battery Level Indicator

The battery symbol in the status bar indicates the data status. When it indicates , it means full battery, and  means low power.

When the remaining battery power is too low, it will indicate the instrument is about to shut down. If not charged with the dedicated power

SECTION 4

adapter, the instrument will automatically shut down after one minute. Please charge the empty battery for about 9 hours. After charging is completed, the instrument will first use the external power without consuming the battery.

4.6.2 Battery Life

The battery life is about **15 hours** after fully charged.

4.7 Tilt Stand

The retractable stand is located at the rear of the instrument, allowing the instrument to be placed at an angle of about 60°.

SECTION 5

Operation

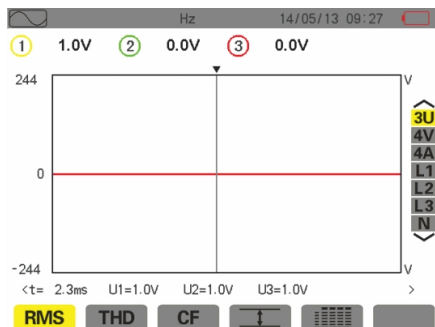
Note: Set the instrument before using it.

Do not measure voltages exceeding 1000V RMS to ground.

5.1 Setup

Press the ON/OFF  key to boot.

After about 3 seconds, it will show the below waveform chart.



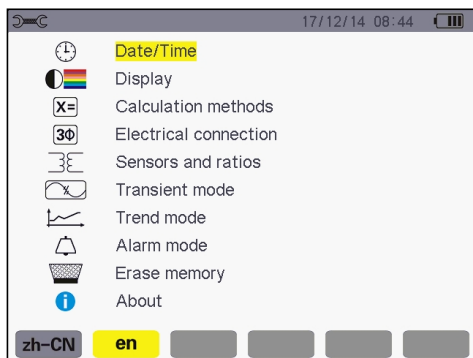
5.2 Setting

The steps for setting the configuration parameters and test parameters of the instrument are as follows:

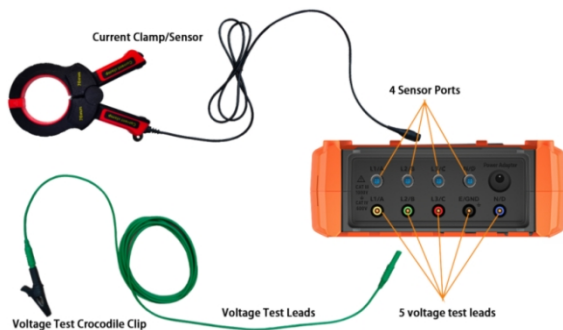
- Press the  key to enter the setting interface.
- Press the   key to select the parameter that needs to be changed and press the  key to enter the sub- menu. Press the   key to navigate.

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and   key to browse the information of sub-menu, and press the  key to confirm. Press the  key to return to the main menu.



5.3 Test Leads Connection



Operation Steps for Test Leads Connection

Current Measurement:

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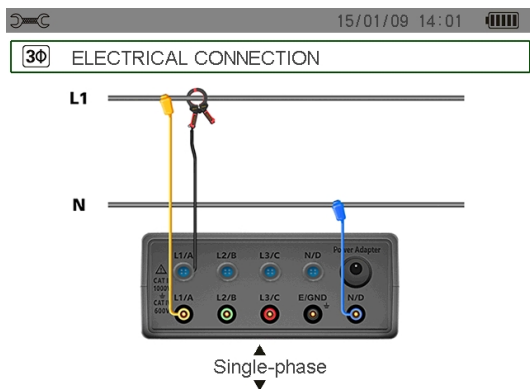
Connect the test leads of the current clamps to the current interfaces L1/A, L2/B, L3/C and N/D, and the current clamps correspondingly to ensure the accuracy of the test.

Voltage Measurement:

According to the color of the test leads, connect 5 voltage test leads to the voltage input interface L1/A, L2/B, L3/C, E/GND, and N/D of the instrument. Please set the voltage ratio before measurement.

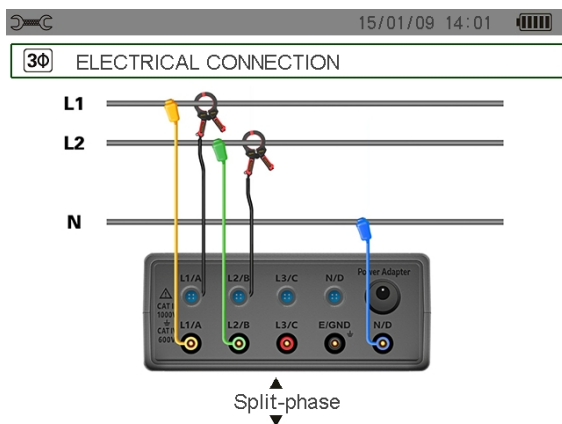
Connect the test leads to the circuit under test according to the diagram below

5.3.1 Single-phase Electrical Power

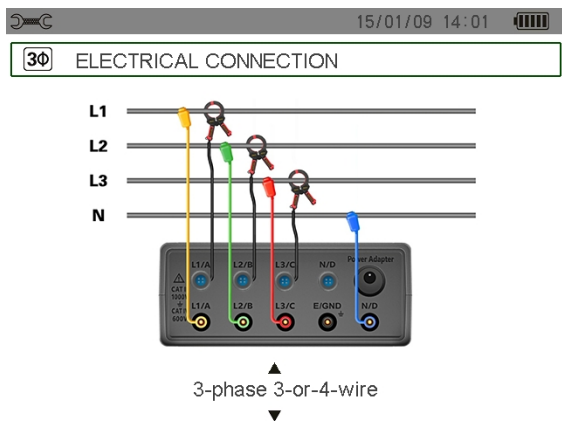


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5.3.2 Split-phase Electrical power

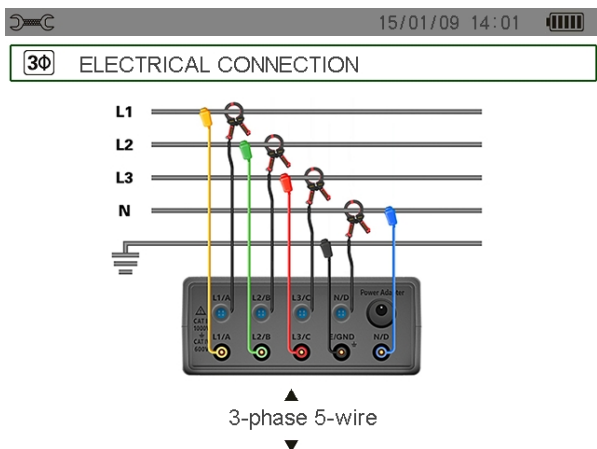


5.3.3 Phases and 3- or-4-wire Electrical Power



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5.3.4 3-phase 5-wire Electrical Power



5.3.5 Connection Step

- Turn on the instrument.
- Set the voltage ratio of the instrument, and select the current clamp and connection mode.
- Connect the test leads and current clamp to the instrument.
- Connect the ground and/or neutral voltage test leads to the grid ground and/or neutral.
- Clamp the current clamp of the neutral wire to the neutral wire.
- Connect the voltage test lead of the L1 phase to the L1 phase of the power grid, and the current clamp of the L1 phase clamps the L1 line.
- If necessary, repeat the above connection of L1 for L2 and L3.

NOTE: Following the steps will reduce connection errors and save time.

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5.4 Disconnect steps

- Disconnect in reverse order. The ground or neutral wire is disconnected last.
- Unplug the instrument lead and switch it off.
- Charge the battery and upload the recorded data during the test if necessary.
- USB is used for data transmission, and the battery can be charged by a dedicated adapter.

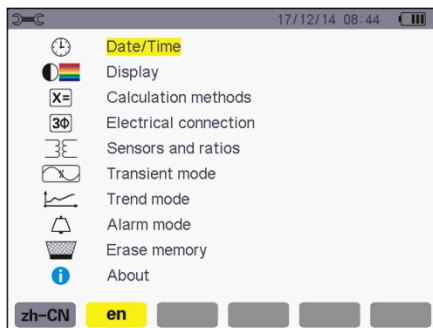
SECTION 6

Setting

Before using the instrument, press the  key to enter the main menu to set the parameter or modify the setting if necessary. The setting information will be saved in the instrument after shutdown.

6.1 Set the Sub-Menu

Press the   to select the Sub Menu, and then press the  key to confirm and  key to return to the main menu.



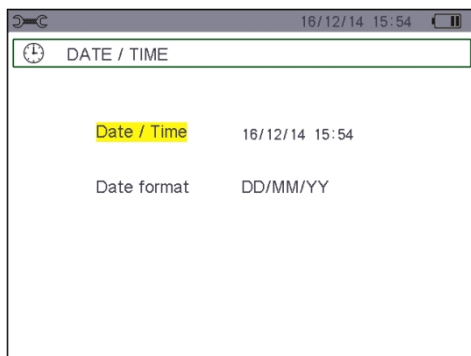
6.2 Language

Press the corresponding function key to select the instrument display language, Chinese/CN or English/EN. An icon with a yellow background indicates the current language in use.

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6.3 Date/Time

When selecting the Date/Time, it is highlighted in yellow.

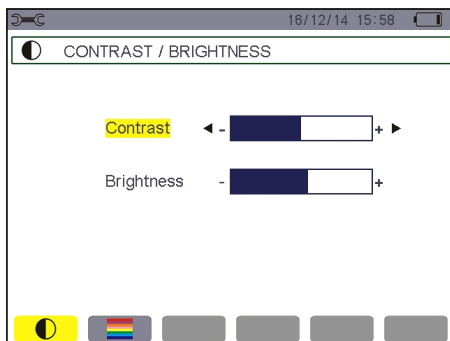


- Press the  key to modify the Date/Time. The Arrow   indicates that the current value can be changed, press the   key to increase or decrease, and press the   to select the value needed to be modified, and then press the  key to confirm.
- Press the   key to modify the date format of DD/MM/YY, MM/DD/YY, or MM/DD/YY, highlight in yellow, and press the  key to confirm.
- Press the  key to return to the setting menu.

6.4 Display

SECTION 6

6.4.1 Contrast&Brightness

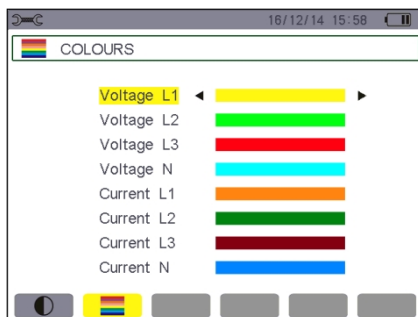


- Press the   key to modify contrast.
- Press the   to select brightness.
- Press the   key to modify brightness.
- Press the  key to return to the main menu.

6.4.2 Color

Press the corresponding function key to select the icon , the color of the voltage and current waveform curves. Available colors are: yellow, orange, red, light red, brown, green, dark green, light blue, sky blue, dark blue, light gray, gray.

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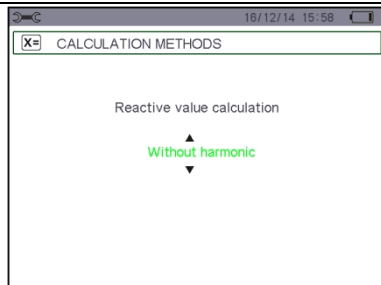


- Press the   key to select the color of the voltage and current curves.
- Press the   key to enter the next option.
- Press the  key to return to the main menu.

6.5 Calculation Methods

 Menu: Setting whether to include harmonics or not when calculating reactive parameters

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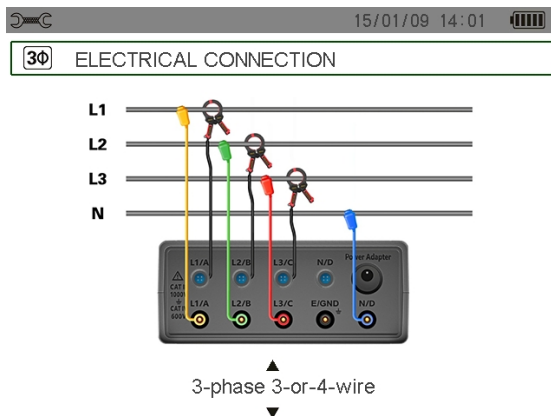
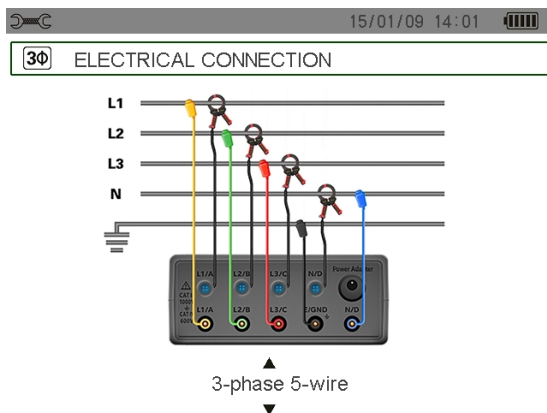


- Press the   key to choose “with harmonic” or “without harmonic”.
- With harmonic: It includes harmonics when calculating parameters.
- without harmonic: It does not include harmonics when calculating parameters.
- Press the  key to return to the main menu.

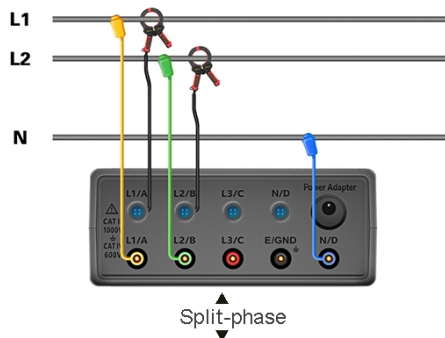
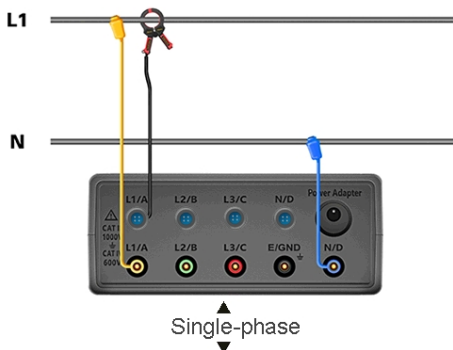
SECTION 6

6.6 Electrical Connection

3Φ Menu: diagram of the electrical connection



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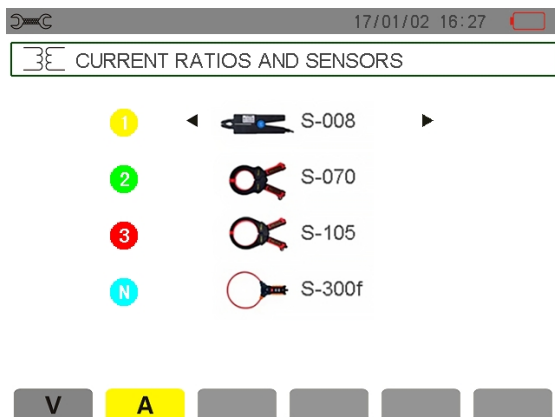
SECTION 6

- Press the   key to select single-phase, split-phase, 3-phase 3-or-4-wire, 3-phase 5-wire.
- Press the  key to return to the main menu.

6.7 Sensors and Ratios

6.7.1 Sensor

 Menu: Press the corresponding function key to select the icon "A" at the bottom of the screen to select sensors and ratios. There are 5 types of current clamps. The actual turn ratio can be set according to the needs.



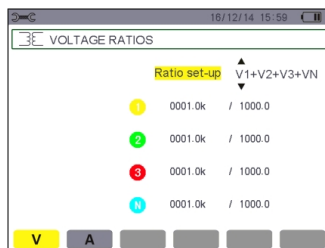
Current Clamp Description :

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	S-008 Current Clamp: 10mA ~ 10A
	S-070 Current Clamp: 0.10A ~ 100A
	S-105 Current Clamp: 1.0A ~ 200A
	S-150 Current Clamp: 10.0A ~ 600A
	S-100JF、S-200JF、S-300JF Rogowski Coil: 5A ~ 100A, 50A~1000A, 100A~9000A

6.7.2 Voltage Ratio

 Menu: Press the corresponding function key to select the icon **V** at the bottom of the screen to set voltage ratio.



Ratio Setting for 4 Channels of Voltage:

- **4V,1/1** means that the ratio for 4 channels of voltage is 1 : 1.

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- **4V** means that the ratio for 4 channels of voltage is the same.
- **3V+VN** means that the ratio for L1, L2, and L3 is the same and adjustable for N.
- **V1+V2+V3+VN** means that the ratio for L1, L2, L3, and N is adjustable.

Operation Step:

- Press the  key, when it appears the  arrow, press the   key to select any of the above ratios, and then press the  key to confirm.
- Press the   key to select the adjustable ratio value, it will highlight in yellow.
- Press the  key, it will  arrow.
- Press the  key to position the item that needs to be modified, press the   key to increase or decrease, and then press the  key to confirm.
- Press the  key to return to the main menu.

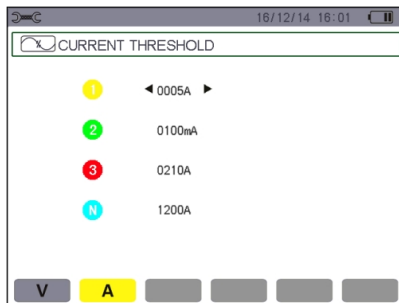
6.8 Transient Mode

 Set the voltage threshold and current threshold.

6.8.1 Current Threshold

 Press the corresponding function key to select the icon “A” at the bottom of the screen to select the current threshold.

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- The arrow ◀ ▶ indicate the current channel is selected.
- Press the ▲ ▼ to select different current channel, and then press the ENTER key. When it appear ▲▼ arrow, start to modify the value.
- press the ◀ ▶ the key to position the items and the unit (mA/A), and press the ▲ ▼ key to increase the Value of current threshold.
- After modification, press the ENTER key to confirm.

6.8.2 Voltage Threshold

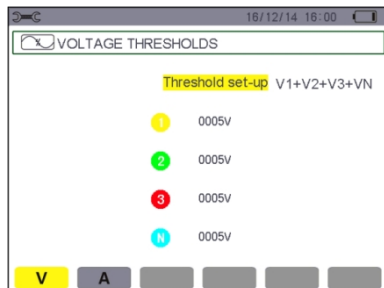
 Press the corresponding function key to select the icon “V” at the bottom of the screen to select the voltage threshold.

Three Options for Voltage Threshold :

- 4V means that the threshold for 4 channels of voltage is the same.;
- 3V+VN means that the threshold for L1, L2, and L3 is the same and adjustable for N.

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- V1+V2+V3+VN means that the threshold for L1, L2, L3, and N is adjustable.



- Press the  key, when the ratio setting appears  arrow, press the  key to choose different threshold, and then press the  key to confirm.
- Press the  key to select the corresponding threshold value, the selected field is highlighted in yellow.
- Press the  to enter threshold setting, when it appears  arrow, start to modify.
- Press the  key to select the position or the unit of the threshold value (V/kV), press the  key to increase or decrease, and then press the  key to confirm.
- Press the  key to return to the main menu.

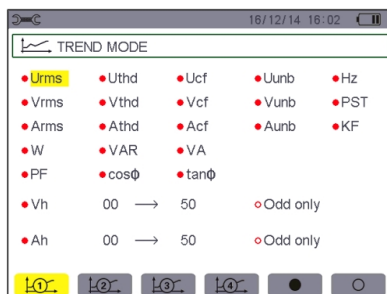
SECTION 6

6.9 Trend Mode

Trend Mode records the measured or calculated value.

Menu  : set the parameters to be monitored in the trend chart recording

Press the corresponding function key to choose the icon , , ,  to display the monitoring parameter group. The selected group is highlighted in yellow.



- Press the corresponding function key to select icon  to set monitoring parameter group 1.
- Press the   and   key to move the cursor, highlighting in yellow.
- Press the  key to select or cancel it, a solid red dot item means being selected, and a hollow red circle is not selected.

Optionally monitored:

Value	Description
-------	-------------

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Urms	Line Voltage True RMS
Uthd	Line voltage harmonic distortion ratio (2 ϕ , 3 ϕ)
Ucf	Line voltage peak factor (2 ϕ , 3 ϕ)
Uunb	Line voltage unbalance (2 ϕ , 3 ϕ)
Hz	Grid frequency
Vrms	Phase Voltage True RMS
Vthd	Total harmonic distortion rate of phase voltage
Vcf	Phase voltage peak factor
Vunb	Phase voltage unbalance (2 ϕ , 3 ϕ)
PST	Short-term voltage flicker
Arms	Current RMS
Athd	Total harmonic distortion rate of current
Acf	Current peak factor
Aunb	Current unbalance (2 ϕ , 3 ϕ)
KF	K factor
W	Active power
VAR	Reactive power
VA	Apparent power
PF	Power factor
DPF	Displacement power factor
Tan	Tangent
?	See note here (harmonics related)

Note: Set the parameters for the below two rows.

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Harmonic Setting

These two rows involve monitoring the harmonics VAh, Ah, Vh, and Uh, etc. Users can independently select the harmonic order from 0 to 50 to record the corresponding harmonic content rate, and can also choose to record only odd harmonics. The specific operation is as follows:

- Select the harmonic parameters  to be monitored, highlight in yellow.
- Press the  key, when it appears   arrow, press the   key to choose Vah, Ah, Vh, or Uh. If it appears “? ”, it means the
- parameter is not selected. Press the  key to confirm, the selected parameter will be highlighted in yellow.
- Press the  key to enter the next item.
- **Select starting harmonic order:** select the harmonic order, highlight in yellow, press the  key, when it appears   arrow, press the   key to increase or decrease the starting harmonic order, press the  key to confirm, and press the  key to enter the next item.

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- **Select End Harmonic Order:** It must be greater than or equal to starting harmonic order. When it is highlight in yellow, press the  key, when it appears   arrow, press the  key to increase or decrease the end harmonic order. Press the  key to confirm, and press the  key to enter the next item.
- **Record Only Odd Harmonics:** press the  key to select or cancel record-only odd harmonics, a solid red dot indicates that it is selected.

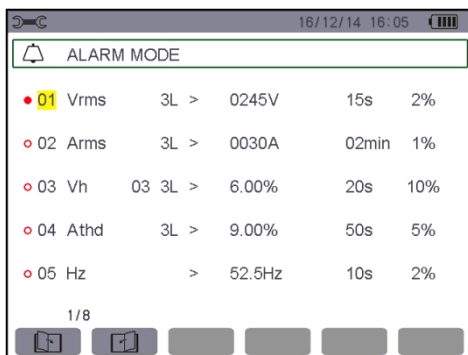
● Vh	00	→	50	○ Odd only
● Ah	00	→	50	○ Odd only

- Settings for recording harmonic orders
- Press the  key to return to the main menu.
- Set another set of trend graph record monitoring parameter in the same way.

6.10 Alarm Mode

 **Menu:** It is used to set the parameters and thresholds that need to be monitored in the alarm mode, and the user can set 40 groups of alarm monitoring parameters.

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- Press the   key to set different alarm parameter groups.
- Press the  to select the current group, appearing the  arrow.
- Press the   to set the value for Vah, Ah, and Uh, Press the  key to confirm, the selected item is highlighted in yellow.
- Press the   to move the cursor, press the  key to confirm, appearing the  arrow. Press the   key to choose the value, and press the  key to confirm.

Use the same method to set the other alarm parameter groups.

- **Alarm Type:** Vah, Ah, Uh, Vh, Tan, PF, DPF, VA, VAR, W, Athd, Uthd, Vthd, KF, Hz, Aunb, Vunb, Vrms, Acf, Ucf, Vcf, PST, Arms, Urms, and Vrms.
- **Harmonic Order** from 0 to 50 for **Vah, Ah, Uh, and Vh.**

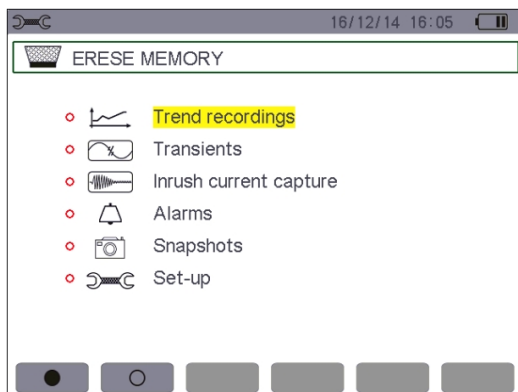
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- **Alarm Trigger Channel:** 3L, any phase of L1, L2, and L3 can be triggered; N: Neutral line is triggered.
- **Alarm Direction:** choose alarm direction > or < under alarm type of Arms, Urms, Vrms, and Hz. Other alarm types have one direction.
- **Alarm Threshold:** set the alarm threshold among the alarm type of W, VAR, VA, Arms, Urms, and Vrms.
- **Duration for over-alarm threshold:** 0 seconds to 99 minutes.
- **Alarm Hysteresis:** 1%, 2%, 5%, or 10%, exceeding the percentage will stop warning.
- Press the  key to select or cancel the alarm parameter group, a solid red dot item means being selected, and a hollow red circle is not selected.
- Press the corresponding function key to select the icon   to display the previous or next page of the alarm parameter group.
- Press the  key to return to the main menu.

6.11 Erase Memory

 Menu: delete part or all of the data stored in the instrument, including the trend graph record, transient record, inrush current, alarm, snapshot, instrument setting, and monitoring parameter setting, etc.

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Partial Delete:

- Press the   key to select the option to be deleted, the selected field will be highlighted in yellow.
- Press the  key to select or cancel it, a solid red dot item means being selected, and a hollow red circle is not selected.
- Press the corresponding function key to select the icon , when it is highlighted yellow, it is ready for delete, press the corresponding function key again to select the icon  to cancel delete.
- In preparation for deletion, press the  key to delete the selected items. Press the  key to return to the main menu.

Delete All

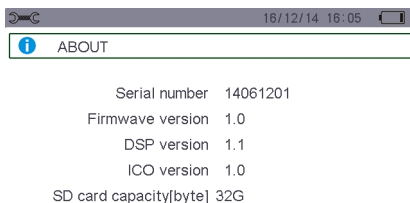
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- Press the corresponding function key to select the icon ● to choose all the saved data, a solid red dot item means being selected and the screen will indicate that the instrument will shut down after deleting the setting.
- Press the corresponding function key to select the icon ○ to cancel choosing, a hollow red circle means not being selected.
- Press the  key to return to the main menu.

Note: If you choose to delete the parameters, the screen will indicate that the instrument will shut down after deleting the setting

6.12 About

The screen displays the serial number, firm wave version, DSP version, ICO version, and SD card capacity.

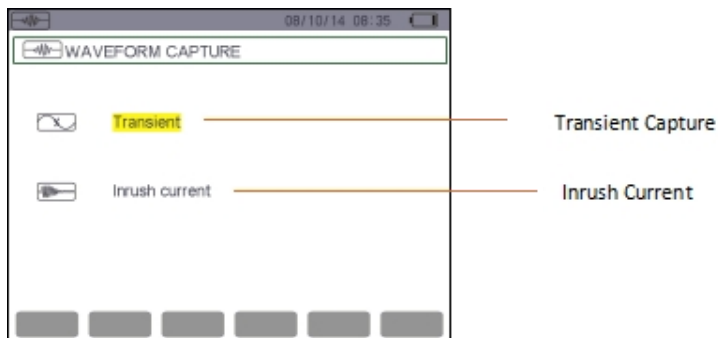


Press the  key to return to the main menu.

SECTION 7

Waveform Capture

7.1 Select Transient or Inrush Current

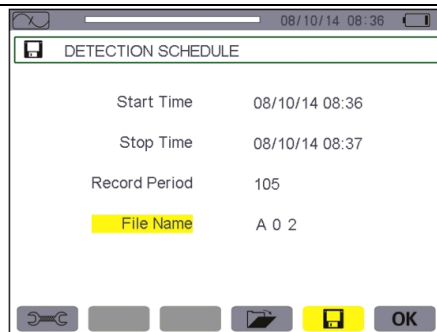


- Press the   key to choose the waveform mode, the selected model is highlighted in yellow.
- Press the  key to confirm.
- Press the  key to return to Waveform Capture Interface.

7.2 Transient Mode

Transient measurement mode can detect transient event records, browse transient records, and choose to delete transient records. It can save 150 sets of transient detection records.

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7.2.1 Detection Schedule

Press the corresponding function key to select the icon  to display detection schedule.



Parameter Setting

- Press the   key to select the start time/stop time, highlighting in yellow, and press the  key to set the value appearing the  

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arrow.

- Press the   key to increase or decrease the value, and press the   key to move to the next value.
- Note: The start time must be longer than the stop time.
- Press the  key to confirm the start time/stop time of the detection.
- Set the number of records in the same way, up to 150 transient records;
- Set the file name in the same way. The file name can be composed of numbers from 0 to 9 and letters from A to Z, with 8 characters.
- Press the corresponding function key to select the icon  to set the voltage threshold and current threshold, and then
- Press the  key to return to the waveform capture interface.

Start Detection

- Press the corresponding function key to select the **OK** icon to start or stop detection.
- The **OK** icon disappears, and the icon  appears.
- It will indicate “recording standby” before the start time, and the icon  in the status bar keeps flashing.
- When it is the start time, it indicates “recording”.
- When it is the stop time, it will show the “detection schedule” and **OK** icon. Continue to start the next detection.

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Note: Transient capture is related to voltage and/or current, and is consistent with the trigger threshold. The instrument will save current and voltage waveforms if triggered by an event.

Press the  key to return to the waveform capture interface.

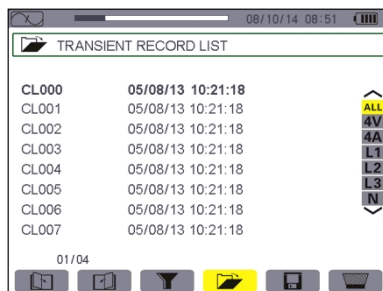
Stop Detection

Before the time reaches the stop time, press the corresponding function key to select the icon  to stop detection, when it will appear the **OK** icon.

7.2.2 Transient Record List

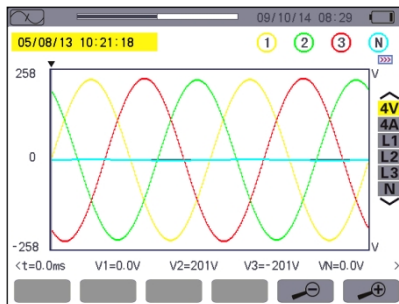
Step as follows:

- Press the corresponding function key to select the icon  to show the transient record:



- Press the   key to select the transient detection record to be displayed, and the selected line will be displayed in bold, and then press the  key to confirm. It will be displayed in the form of a graph.

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- Press the   key to select the curve to be displayed, and press the   key to move the cursor. Hold and
- Press to quickly move the cursor.
- Press the  key to return to the transient record list.

7.2.3 Delete Transient Record

The delete icon  only appears when the list of transient records is displayed, delete it as follows:



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- Press the   key to select the transient record to be deleted, and the selected record will be displayed in bold.
- Press the corresponding function key to select the delete icon , when the icon  is highlighted in yellow, it is ready for deletion. Press the function key to select the icon  or press the  key to cancel deletion.
- When it is ready for deletion, press the  key to confirm the deletion.

7.3 Inrush Current

The inrush current mode can monitor the current waveform and voltage waveform when the electrical equipment starts. The capture record includes RMS and PEAK.

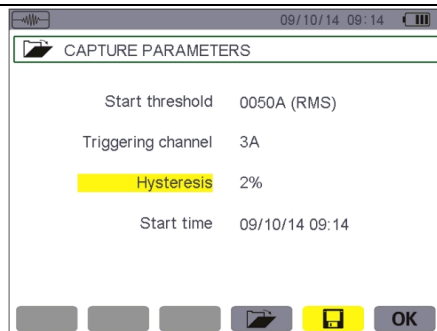
The instrument can only store a set of inrush current waveform capture diagrams.

7.3.1 Capture Parameters

Steps as follow:

Press the corresponding function key to select the icon  to enter the capture parameters.

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Parameter Setting Step

- Press the   key to select the start threshold, highlighted in yellow, and press the  key to set parameters when it appears   arrow in the Start threshold bar.
- Press the   key to increase or decrease the value, and then press the   key to set next value.

Press the  key to confirm.

Set the triggering channel, alarm hysteresis, and start time in the same way.

Start Capture Setting Step

- Press the function key to select the **OK** icon to set the date and time for start capture.
- The **OK** icon disappears, and appear the icon .
- The screen displays "Capture Standby" before the start time and the icon  keeps flashing in the upper screen.

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- When it reaches the start time and meets the activation conditions, it will display "capture in progress". The memory card storage will indicate in the capture process and disappear after the capture ends.
- If it meets the stop condition, or the instrument memory is full, the capture will stop automatically, and the "Capture Schedule" and OK icon will appear again.

Note: The instrument can only store a set of inrush current capture waveforms, so the user needs to delete the previous capture before proceeding to the next capture.

Press the  key to return to the waveform capture menu.

The User stops the waveform capture

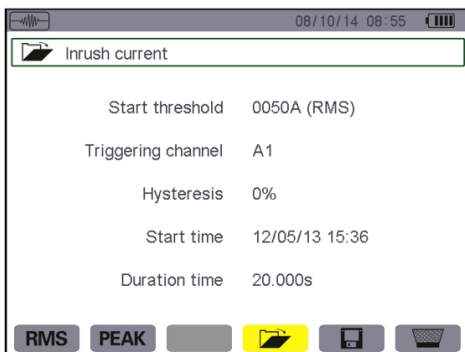
The user can press the function key to select the icon  to stop waveform capture, and then the **OK** icon will appear in the same time.

7.3.2 Display Capture Parameters for Inrush Current

Step as follows:

- Press the corresponding function key to select the icon  to open the Inrush Current Record.

SECTION 7



- Press the corresponding function key to select **RMS or PEAK** mode.
- The instrument displays the **RMS or PEAK** current waveform and voltage, and the user can move the cursor along the waveform curve to zoom in or out to observe the relevant value of the waveform.

Eg:

- The instantaneous current value or voltage value;
- Maximum instantaneous current value of the whole startup cycle;
- The half-cycle current RMS value;
- Maximum half-cycle current RMS value of the whole startup cycle;
- The maximum instantaneous value (PEAK);
- Start time and motor start cycle.

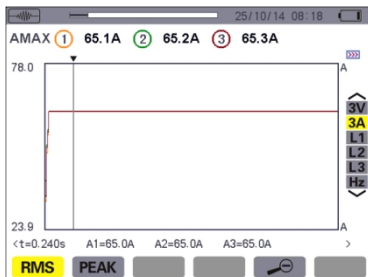
NOTE: Voltage must be present before the motor starts at a stable and correct servo control frequency.

SECTION 7

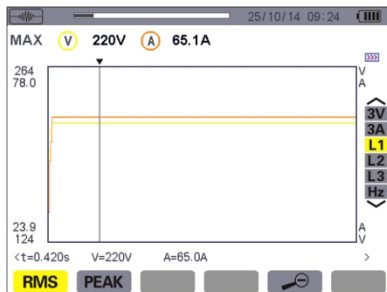
7.3.3 RMS Mode

The RMS mode can display the half-cycle true effective value trend curve of the start-up process.

3A under RMS Mode



L1 under RMS Mode



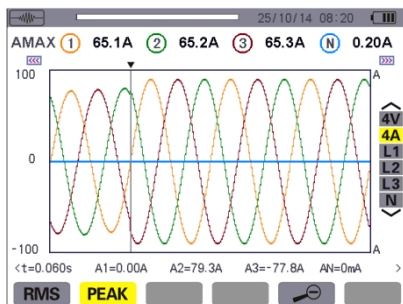
Note: L2 and L3 can display the RMS curve graph of the half-cycle current and voltage for phase 2 and phase 3 during the start-up process, which is the same as the L1.

SECTION 7

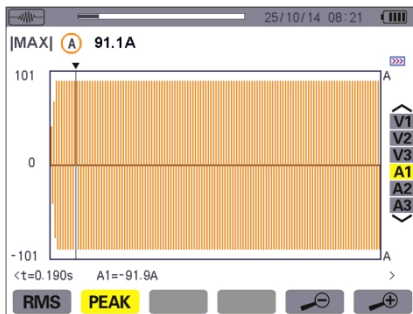
The instantaneous value of inrush current under PEAK Mode

PEAK mode displays the envelope and the waveform of the inrush current capture.

4A under PEAK Mode



A1 under PEAK Mode



Note: The screen for A2 and A3 is similar to A1, and so as V1, V2, and V3.

SECTION 9

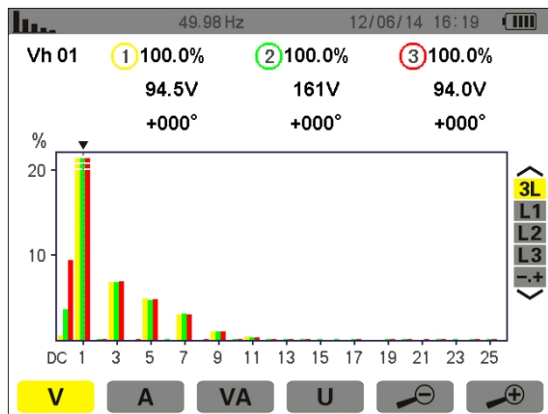
Harmonic Mode



Harmonic mode can display the harmonic content rate of voltage, current and apparent power, measure the harmonic current generated by nonlinear loads, and analyze problems caused by harmonics, eg, the heating conditions of neutral wires, wires and motors, etc.

8.1 Select the Sub Menu

Press the corresponding function key to select the measurement type.

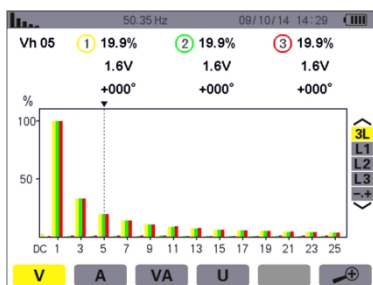


8.2 **V** Phase Voltage Harmonic

- Single Phase: L1
- 2 Phases: 2L: L1, and L2
- 3 phases 4 wires or 5 wires: 3L: L1, L2, and L3, -+ (expert mode)

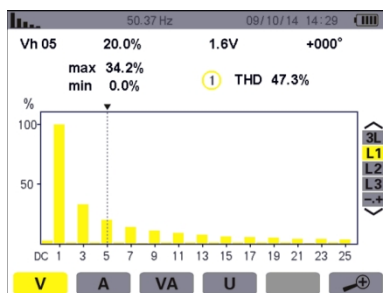
SECTION 8

8.2.1 3L Phase Voltage Harmonic



Expert mode is only for 3 phases connection, eg, 3×3L or L1, L2 and L3.

8.2.2 L1 Phase Voltage Harmonic

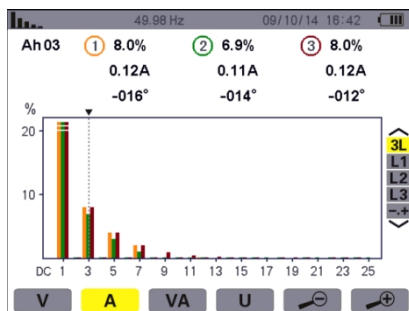


Note: The screens of phase harmonic for L2 and L3 are the same as L1.

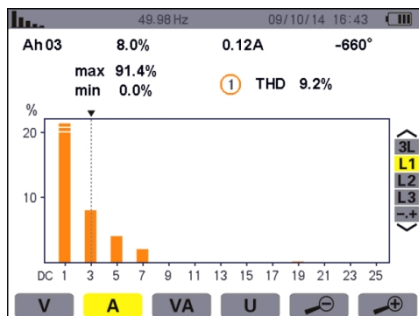
SECTION 8

8.3 Current Harmonic **A**

8.3.1 3L Current Harmonic



8.3.2 L1 Current Harmonic

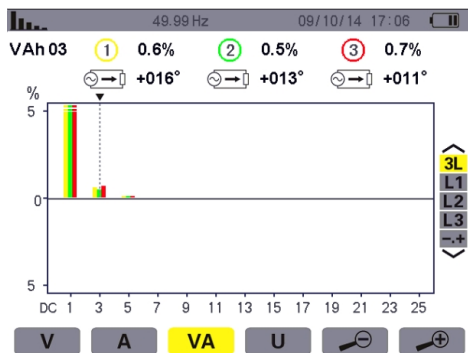


Note: The screens of current harmonic for L2 and L3 are the same as L1.

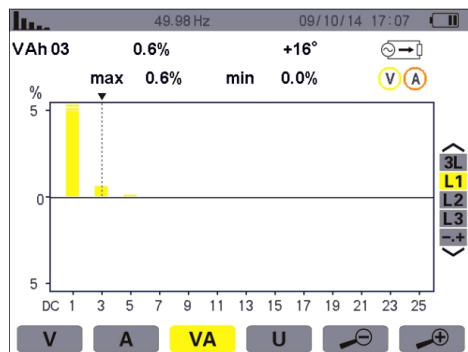
SECTION 8

8.4 Apparent Power Harmonic **VA**

8.4.1 3L Apparent Power Harmonic



8.4.2 L1 Apparent Power Harmonic



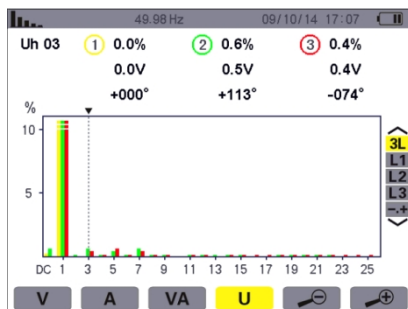
Note: The screens of apparent harmonic for L2 and L3 are the same as L1.

SECTION 8

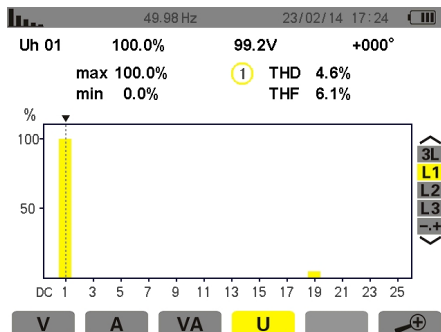
8.5 Line Voltage Harmonic **U**

The sub-menu shows line voltage harmonics for 2 phases and 3 phases connections.

8.5.1 3L Line Voltage Harmonic



8.5.2 L1 Line Voltage Harmonic



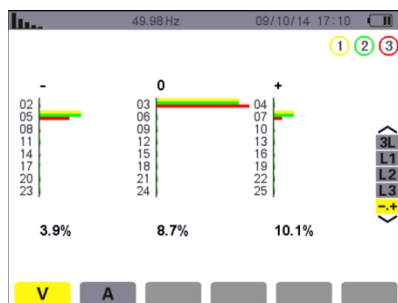
SECTION 8

8.6 Expert Mode

Expert mode is only available for three-phase connections, used to display the effects of neutral heating or harmonics in rotating electrical machines. Press the   to select expert mode and the icon  is highlighted in yellow. There are two sub-menus,  and .

8.6.1 Phase Voltage under Expert Mode

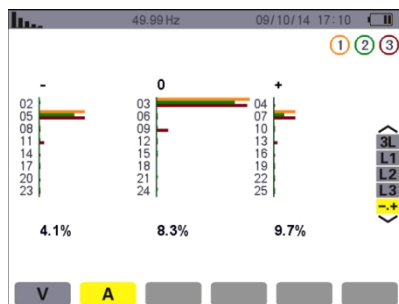
The sub-menu displays the effects of neutral heating or harmonics in rotating electrical machines.



8.6.1 Current under Expert Mode

The sub-menu displays the effects of current harmonic under neutral heating or rotating electrical machines.

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S510
Power Quality Analyzer

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Eaglotest Technology

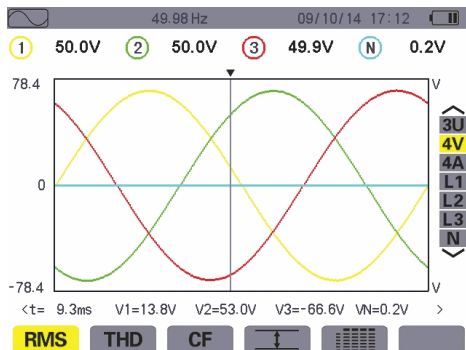
SECTION 9

Waveform Mode

Waveform mode can display voltage and current graphs, measured values, and calculated values, excluding power, energy, and harmonics.

9.1 Select the Sub-Menu

Press the corresponding function key to select the measurement type.



9.2 RMS

RMS: display the waveform of the measured signal and the true RMS value

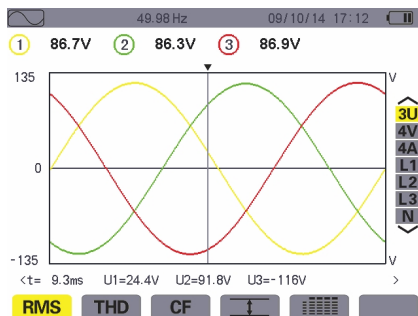
of voltage and current within a certain time.

- Single phase: L1
- 2 phases: 2V, 2A, L1, L2
- 3 phases 3 wires or 4 wires: 3U, 3V, 3A, L1, L2, L3
- 3 phases 5 wires
- For **THD**, **CF** and $\angle \otimes$: 3U, 3V, 3A, L1, L2, L3

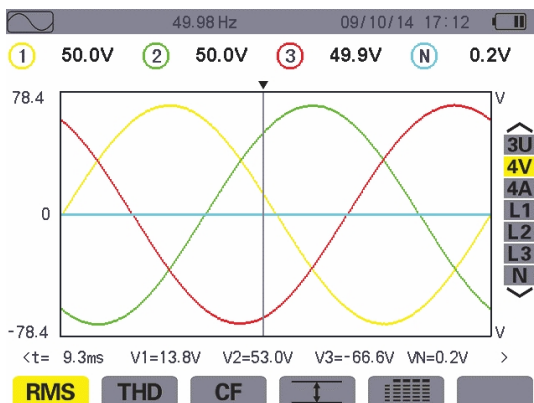
SECTION 9

- For **RMS**, , : 3U, 4V, 4A, L1, L2, L3, N

9.2.1 3U RMS for 3-Phase

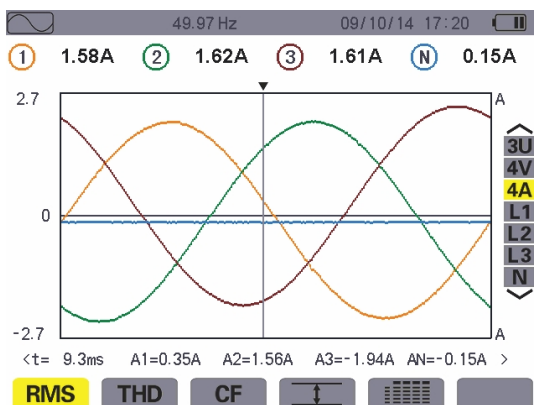


9.2.2 4V RMS for 3-Phase and Neutral Line

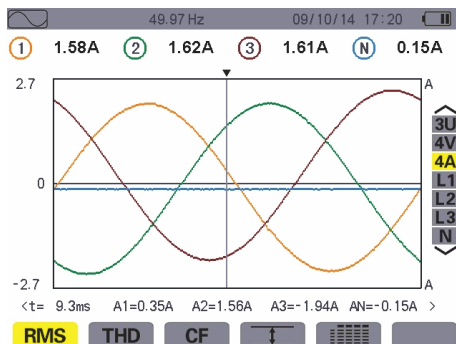


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9.2.3 4A RMS for 3-Phase and Neutral Line



9.2.4 RMS for Neutral Line



Note: The screen of L1, L2 and L3 is similar to Neutral Line.

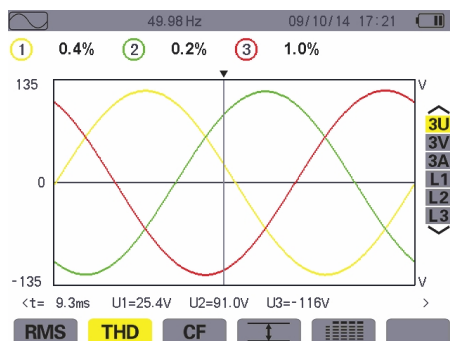
9.3 THD Total Harmonic Distortion

THD: display the waveform of the measured signal within a certain period

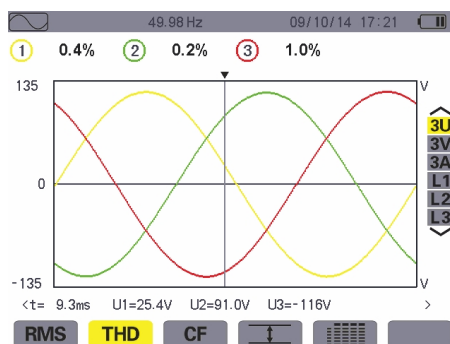
SECTION 9

of time and the total harmonic distortion rate of voltage and current.

9.3.1 3U THD for Line Voltage



9.3.2 3V THD for Phase Voltage



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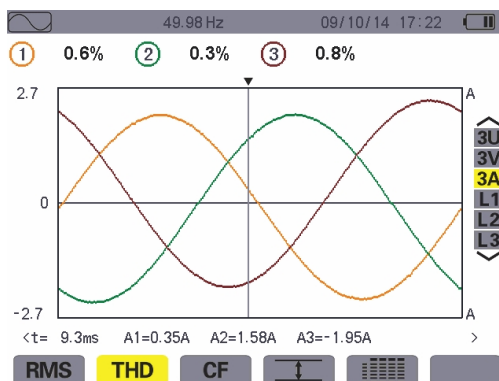
9.3.3 3A THD for Phase Current



9.4 CF Crest Factor

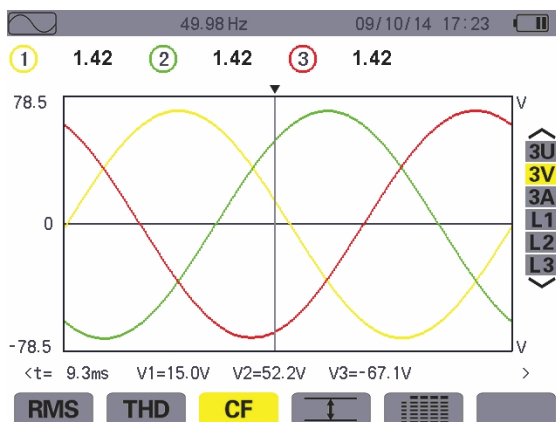
CF: display the waveform of the measured signal within a certain time, and the voltage and current crest factors

9.4.1 3U CF for Line Voltage

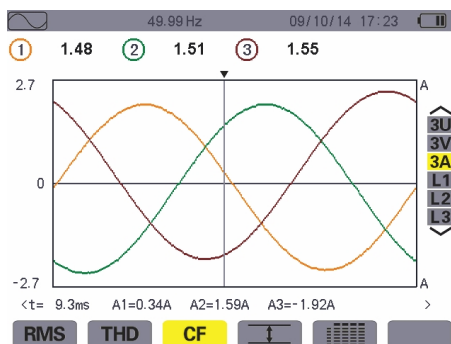


SECTION 9

9.4.2 3V CF for Phase Voltage



9.4.3 3A CF for current

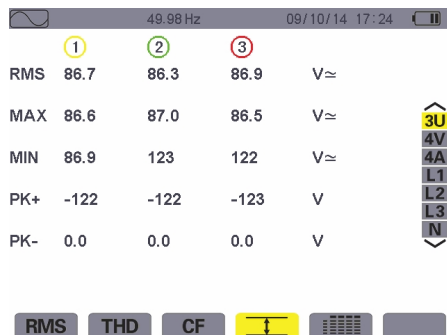


9.5 Peak and Average Values of Voltage and Current

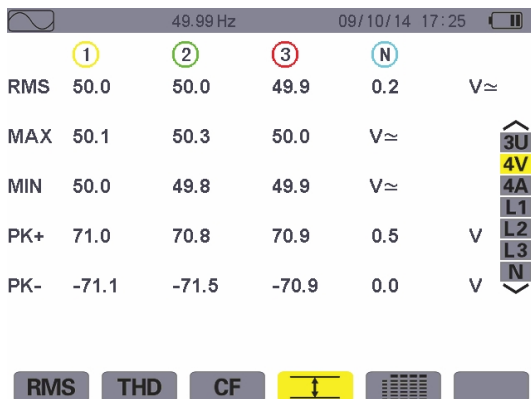
SECTION 9

: Display voltage, current RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value

9.5.1 3U Max&Min



9.5.2 4V Max&Min

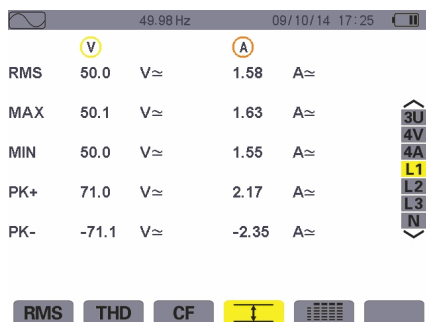


9.5.3 4A Max&Min

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9.5.4 L1 下 Max.&Min



Note: The instrument calculates the maximum and minimum values every half cycle (for example, 10ms at 50Hz), and refreshes the measurement results every 300ms.

The screen of L2, L3, and N is similar to L1.

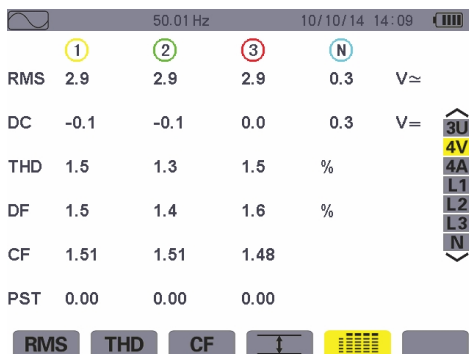
9.6 : Value for RMS,DC,THD,DF,CF,PST,KF

SECTION 9

9.6.1 Simultaneous display screen for each value under 3U

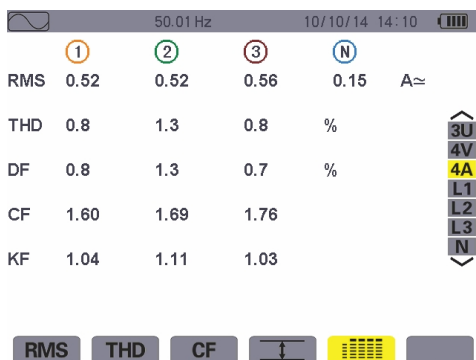


9.6.2 4V for Phase and Neutral Voltage

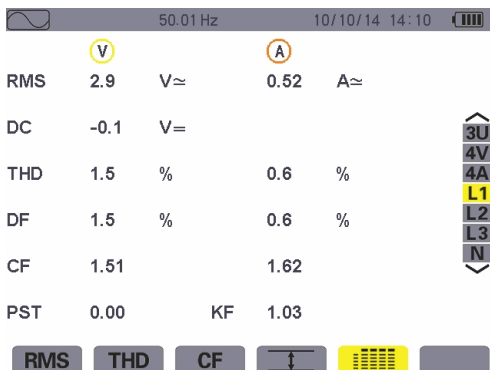


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9.6.3 4A for Phase and Neutral Current



9.6.4 L1 4A for Phase and Neutral Current



Note: The screen of L2 and L3 is similar to L1.

9.6.5 Neutral Line

The screen displays the voltage RMS value and DC value of the neutral wire and the current RMS value.

SECTION 10

Alarm Mode



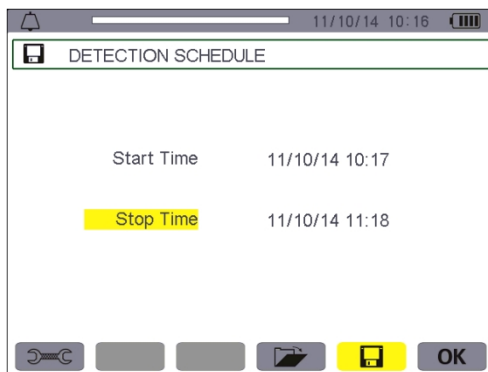
Monitor whether each measured value exceeds the threshold and generate alarm logs, up to 12800 sets, including the value for Vrms, Urms, Arms, PST, Vcf, Ucf, Acf, Vunb, Aunb, Hz, KF, Vthd, Uthd, Vdf, W, VAR, VA, DPF, PF, Vh, Uh, Ah, and Vah.

The user must first set the alarm threshold/hysteresis value before alarm monitoring, and select the set parameter group. If it is a solid red dot, it means selected, hollow red circle means not selected.

The user can transfer the stored alarm records to the PC and save them for later viewing.

10.1 Sub-Menu

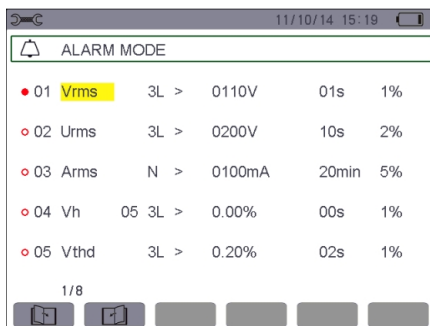
The user can press the corresponding function key to select the sub-menu.



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10.2 Alarm Setting

: The user can set and modify the alarm parameter.



Press the arrow     to view values vertically or horizontally.

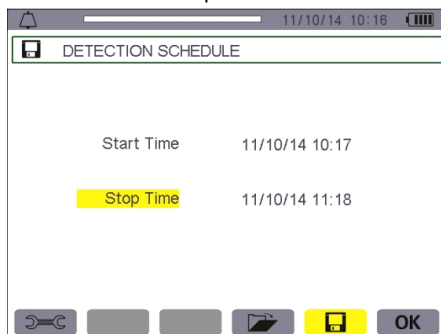
Steps for setting an alarm

- Press the  to set the value, appearing   arrow.
- Press the   key to input the value for Vah, Ah and Uh, and then press the  key to confirm.
- Use the same method to set other values.
- Move the yellow cursor to the first column, press the  key to select the alarm that has been set. A solid red dot item indicates that it has been selected. When it meets the conditions, the instrument can trigger an alarm and generate an alarm log. Repeat the above step to cancel selecting the alarm.
- Press the  key to return to the Detection Schedule interface.

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10.3 Detection schedule

: Setting the start time and stop time for the detection schedule.



10.3.1 Step 1: setting start time and stop time

- Press the   key to select the start time, highlighted in yellow, and press the  key to enter, appearing  arrow. Press the   key to increase or decrease the value, and press the   key to select the value needing to be modified.
- Press the  key to confirm the start time.
- Repeat the above step for setting the stop time.

Note: The stop time must be greater than the start time.

10.3.2 Step 2: Start alarm detection

Press the corresponding function key to select the **OK** icon. The instrument will

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start alarm detection.

- The **OK** icon disappears, replaced by the  icon.
- When waiting to start detection, the instrument screen displays "detection standby", and the  icon flashes in the display bar at the top of the screen.
- After the alarm detection starts, the screen will display "detection in progress".
- After the completion of alarm detection, the instrument will display "detection schedule". The **OK** icon appears, user can set new alarm detection again.

10.3.3 Manually stop alarm detection

Before the stop time, the user can press the corresponding function key to select the  icon to manually stop alarm detection. After stopping, the OK icon will display again in the same position.

10.4 Alarm Log

 : display the up to 12800 alarm logs. Press the corresponding function key to select the icon  to view the alarm log.

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11/10/14 10:37						
ALARM LIST						
08/10/13 09:25	L2	Uthd	>0.2%	0.5%	3.00s	
08/10/13 09:25	L3	Uthd	>0.2%	0.5%	3.00s	
08/10/13 09:25	L1	Vthd	>0.2%	0.5%	3.00s	ALL
08/10/13 09:25	L2	Vthd	>0.2%	0.5%	3.00s	L1
08/10/13 09:25	L3	Vthd	>0.2%	0.5%	3.00s	L2
08/10/13 09:25	L1	KF	>0.20	0.50	3.00s	L3
08/10/13 09:25	L2	KF	>0.20	0.50	3.00s	N
08/10/13 09:25	L3	KF	>0.20	0.50	3.00s	Σ
006/008						

Parameters to be monitored	Default unit	Units with suffix	Example
Arms	A	m for mA k for kA	2.5 for 2.5A 423m, denotes 423mA
Vrms/Urms	V	k, denotes kV	326 indicates 326V 1.2k indicates 1.2kV
W/Var/VA	W/Var/VA	K for kW/kVar/kVA M, means MW/MVar/MVA	W parameter: 315 means 315W W parameter: 5.8k means 5.8kW.
Hz	Hz		50.00 indicates 50.00Hz

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10.5 Delete Alarm Log

Step as follows:

Press the corresponding function key to select the icon , when it is highlighted in yellow , it indicates that it is ready to delete. Press the function key again to cancel the deletion. When the icon  becomes gray, it indicates it is not selected.

When it is ready for deletion, press the  key to delete the alarm log.



ALARM LIST					
08/10/13 09:25	L1	[VAh]03	>0.2%	0.5%	3.00s
08/10/13 09:25	L2	[VAh]03	>0.2%	0.5%	3.00s
08/10/13 09:25	L3	[VAh]03	>0.2%	0.5%	3.00s
08/10/13 09:25	L1	Ah05	>0.2%	0.5%	3.00s
08/10/13 09:25	L2	Ah05	>0.2%	0.5%	3.00s
08/10/13 09:25	L3	Ah05	>0.2%	0.5%	3.00s
08/10/13 09:25	L1	Uh07	>0.2%	0.5%	3.00s
08/10/13 09:25	L2	Uh07	>0.2%	0.5%	3.00s
001/008					

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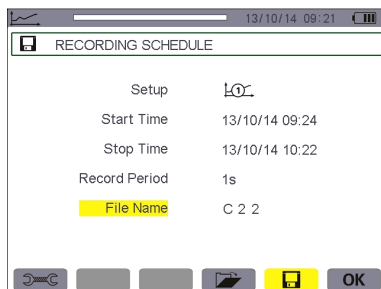
Trend Graph Recording Mode



Records the measured parameters selected in Setup/Trend Graph Recording Mode

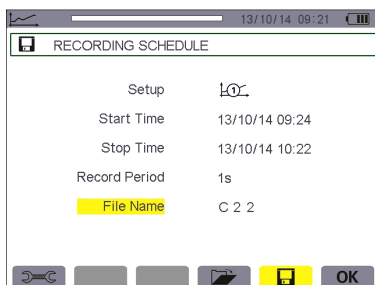
11.1 Choose the Sub Menu

The user can press the corresponding function key to select the icon at the bottom of the screen.



Press the corresponding function key to select the OK icon to start recording.

11.2 Recording Schedule



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11.2.1 Steps for setting parameters for recording

- Press the   key to select Setup, highlighted in yellow, and then press the  , appearing   arrow.
- Press the   key to choose the parameter group from  to , and then press the  key to confirm.
- Press the   key to choose the start time, highlighted in yellow, and then press the  key to enter, when appearing   arrow, press the   key to increase or decrease the value, press the   key to switch year, month, day, hour, and minute.
- Press the  key to confirm the start time.
- Repeat the above step for setting the stop time.
- Note: the stop time must be greater than the start time.
- Press the   key to choose the record period, and press the  key to enter, appearing   arrow.
- Press the   key to increase or decrease, choosing 1 second, 5 seconds, 20 seconds, 1 minute, 2 minutes, 5 minutes, 10 minutes, or 15 minutes.
- Press the  key to confirm the record period.
- Press the   key to choose file name, highlighted in yellow, and

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press the  key to edit the file name. The length can not exceed 8 characters, selecting from A-Z and 0-9 and there should be no spaces in the middle of the file name.

- Press the   key to display one character, and press the   key to switch to the next character.
- Press the  key to confirm the file name.

11.2.2 Start Recording

- Press the corresponding function key to select the OK icon, and the instrument starts recording at the start and stop times set by the user. When the OK icon disappears, appearing the  icon.
- Before the start time, the instrument will indicate "recording standby", and at the same time the  icon will keep flashing.
- When it reaches the start time, the instrument indicates "recording in progress".



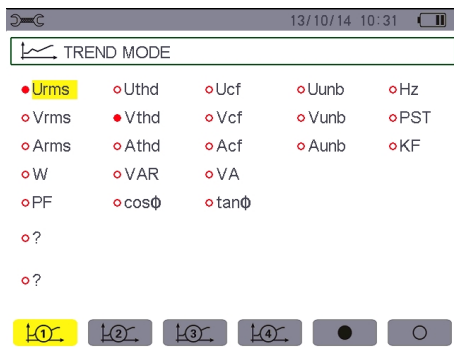
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When it reaches the stop time, the recording schedule and the **OK** icon will appear again at the bottom right corner of the screen), and the recording will automatically stop.

11.2.3 Actively stop the recording

Before the stop time, press the yellow function key to select the  icon at the lower right corner of the screen and the recording will stop automatically. The **OK** icon appears again.

11.3 Graph Recording Parameters Setting



Steps for setting recording :

Take Parameter Group 1 for example

- Press the function key to select the  icon, highlighted in yellow.

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- Press the     key to select the parameter, and press the

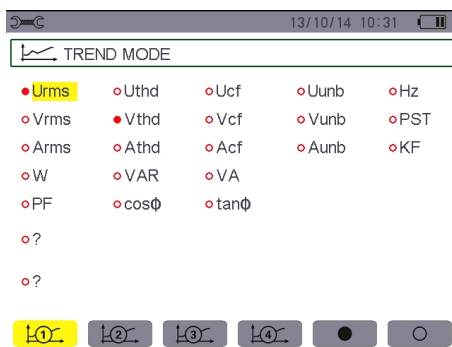


key to confirm. After confirmation, there is a solid red dot in front of the parameter.

Value	Description
Urms	True RMS value of line voltage
Uthd	Line voltage harmonic distortion rate (2 ϕ , 3 ϕ)
Ucf	Line voltage peak factor (2 ϕ , 3 ϕ)
Uunb	Line voltage unbalance (2 ϕ , 3 ϕ)
Hz	Grid frequency
Vrms	Phase voltage true rms
Vthd	Total harmonic distortion of phase voltage
Vcf	Phase voltage peak factor
Vunb	Phase voltage unbalance (2 ϕ , 3 ϕ)
PST	Short-term voltage flicker
Arms	Current RMS
Athd	Total harmonic distortion of current
Acf	Current Peak Factor
Aunb	Current unbalance(2 ϕ ,3 ϕ)
KF	K factor
W	Active power

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VAR	Reactive power
VA	Apparent power
PF	Power Factor
DPF	Displacement Power Factor
Tan	Tangent
Tangent	See note here (related to harmonics)



These two lines involve the recording of 4 different harmonics, including Vah, Ah, Vh, and Uh. For each harmonic, the user can select harmonics order to be recorded from 0 to 50, or only record odd harmonics.

The steps are as follows:

- Enter the parameter to be recorded: the cursor is highlighted in yellow.

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Press the  key, when it appears   arrow, press the   key to choose harmonic parameter from Vah, Ah, Vh and Uh. A solid red dot means it is selected, press the  key to confirm, highlighted in yellow.

- Choose the Start Order, highlighted in yellow. Press the  key, when it appears the   key to choose harmonic order, and press the  key to confirm. Press the   key to enter the next item.
- Choose the Stop Order, highlighted in yellow. The stop order must be greater than the start order. Press the  key, when it appears the   key to choose stop harmonic order, and press the  key to confirm. Press the   key to enter the next item.
- Odd Only
- Press the  key to confirm the selection or cancel the selection, a solid red dot indicates that it is selected.
- Selection: the instrument only records the odd harmonics of the two harmonics group
- Not selected: the instrument records all harmonics, including even

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orders.

11.4 Record List

 Press the corresponding function key to select the  icon to view the data.

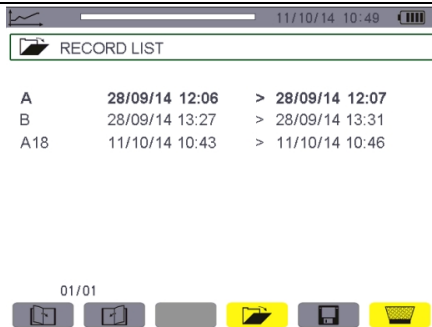


11.5 Delete Record List

The steps are as follows:

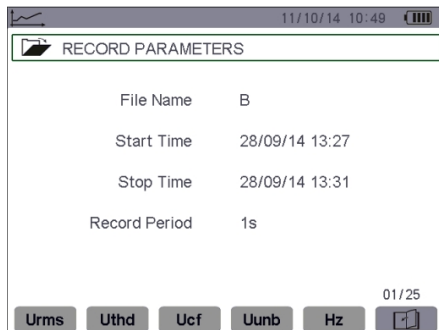
- Press the   key to select the record to be deleted, the selected field will be displayed in bold.
- Press the corresponding function key to select the  icon, when the icon is highlighted in yellow,  it indicates that it is ready to delete, and then press the corresponding yellow function key to cancel the deletion status, and the icon is gray .
- When it is ready to delete, press the  key to delete the selected record.

SECTION 11



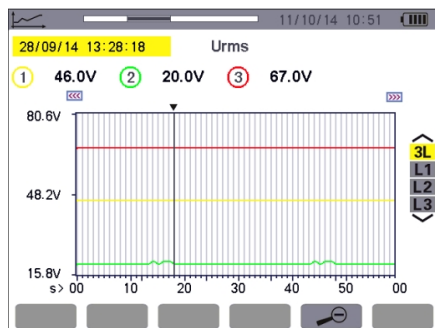
11.6 Record Parameter

11.6.1 Recording of relevant information



SECTION 11

11.6.2 Recording Graph



Line Voltage RMS, exclude the maximum, minimum, and average values

Note: When the value of the position indicates "----", it means there is an error or missing value in the record.

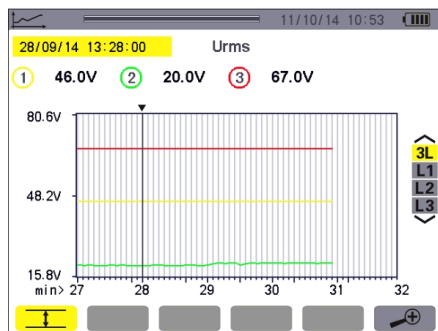


MIN-AVG-MAX Mode

After this mode is activated, the curve point value is the average value of the total sampling points in the display period. If the display period is 20 seconds and the sampling period is 1 second, then the curve point value is the average value of 20 points in the display period. It is more accurate, but the display speed is relatively slow.

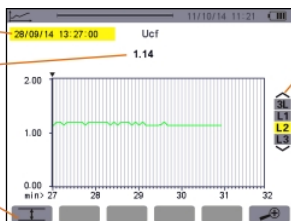
SECTION 11

Recording Graph Screenshot:



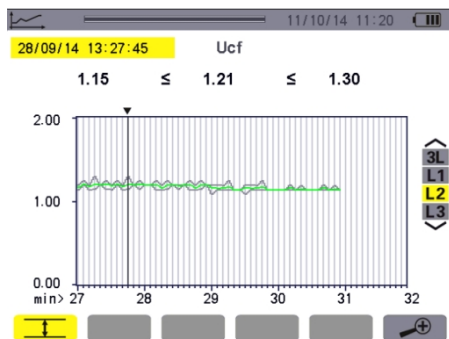
Since the MIN-AVG-MAX mode is activated and each point on the curve represents the arithmetic average over the display period, the display is more accurate and there is no data loss, but the display speed is relatively slow.

Cursor position time
Gray indicates that MIN-AVG-MAX
mode is not activated, press the
corresponding yellow function key to
activate it
Recorded value at the point in time at
which the cursor is located

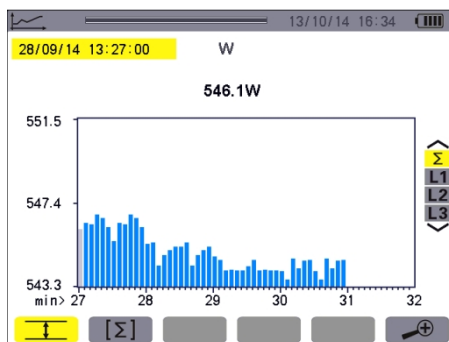


Press the **A** **Y** button to
select the corresponding

SECTION 11



Graph: Ucf of L2 including the maximum, minimum, and average values



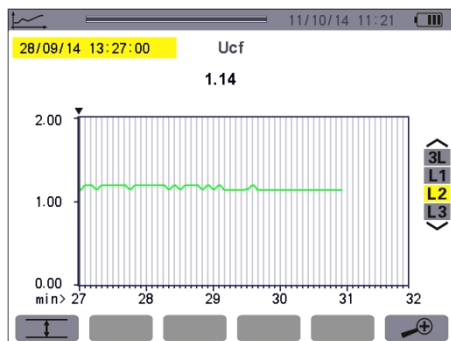
Graph: The sum of three-phase active power, including the maximum, minimum, and average values



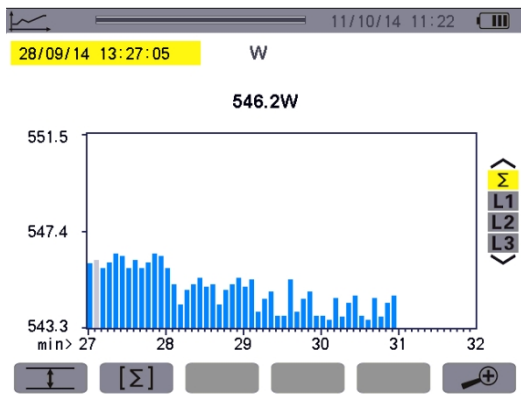
If the MIN-AVG-MAX mode is not activated, it will only display the

SECTION 11

graph composed of 60 record values, and the speed is faster.

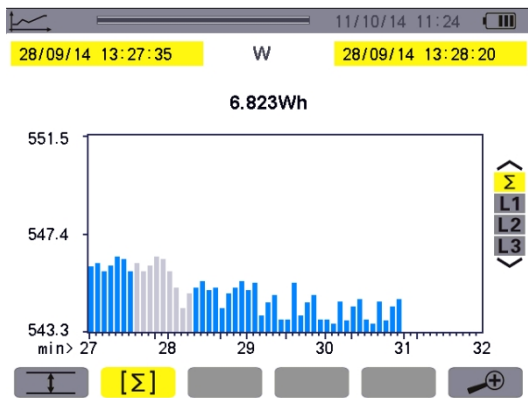


Graph: Ucf of L2 excluding the maximum, minimum, and average values



Graph: The sum of three-phase active power, excluding the maximum, minimum, and average values

SECTION 11



Graph: The sum of three-phase active energy, excluding the maximum, minimum, and average values

Energy Calculation Steps:

- Press the corresponding function key to select the icon Σ to activate energy sum mode. The current cursor time is the start time of energy calculation.
- Press the  key to move the cursor to the point where calculation stops. The instrument automatically calculates the electric energy from the start time to the stop time.

Note: When the cursor moves to the left, it cannot exceed the position of the start time.

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11.6.3 Time required to open the trend graph curve at different time scales

Sampling Period: one second

Display Time(60 points)	1 point	Waiting Time
5days	2hours	30seconds
2.5days	1hour	15 seconds
15hours	15minutes	4 seconds
10hours	10minutes	2 seconds
5hours	5minutes	1 second
1hour	1minutes	1 second
20minutes	10seconds	1 second
5minutes	5seconds	1 second
1minute	1second	1 second

- Press the yellow function key to select the corresponding icon  or  to change the scale.
- Press the  key to move the cursor.
- Press the  key to choose various phase curve.
- The above operations may also cause the value to be obtained and calculated again.

11.6.4 The maximum time set for trend graph recording

The longest recording time is based on the number of selected recording

SECTION 11

parameters and the sampling period.

Parameter	Sampling Period	Maximum Time
123	1second	10 days
1 ~ 20	1second	62 days
123	5seconds	50 days
1 ~ 20	5seconds	300 days
123	1minutes	600 days
1 ~ 20	1minutes	3600 days

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

SECTION 12

Power and Energy Mode

ON-LINE
W

W

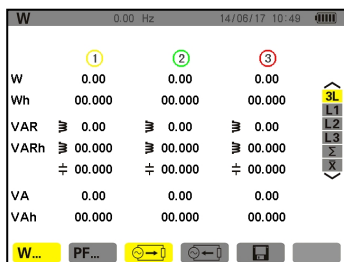
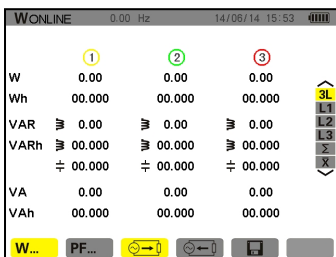
ON-LINE
W

: online power and energy mode

W

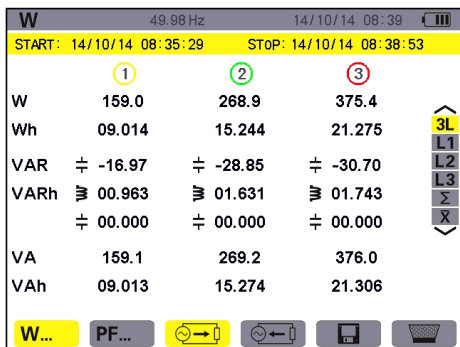
: power and energy mode

The function and operation mode of the two modes are the same.



12.1 Sub-Menu

The user can press the yellow function key to select the corresponding icon.



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12.2 Power Consumption

Display active power, reactive power (capacitive and inductive) and apparent power.

12.2.1 3L Power Consumption

W 49.98 Hz 14/10/14 08:39 			
START: 14/10/14 08:35:29 STOP: 14/10/14 08:38:53			
	①	②	③
W	159.0	268.9	375.4
Wh	09.014	15.244	21.275
VAR	± -17.02	± -29.12	± -30.64
VARh	≡ 00.963	≡ 01.631	≡ 01.743
	± 00.000	± 00.000	± 00.000
VA	159.0	269.5	376.0
VAh	09.013	15.274	21.306
W... PF...    			

12.2.2 L1 Power Consumption

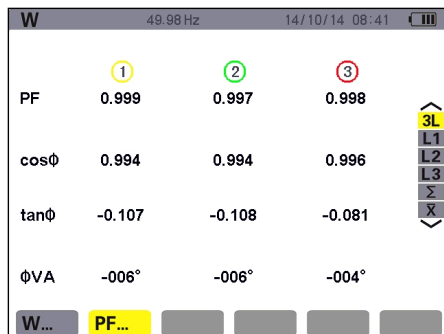
W 49.98 Hz 14/10/14 08:40 			
W	159.1	PF	0.999
Wh	00.000		
VAR	± -17.01	cos ϕ	0.994
VARh	≡ 00.000		
	± 00.000	tan ϕ	-0.106
VA	159.1		
VAh	00.000	ϕ VA	-006°
  3L L1 L2 L3 Σ X    			

Note: The display of L2, and L3 is similar to L1.

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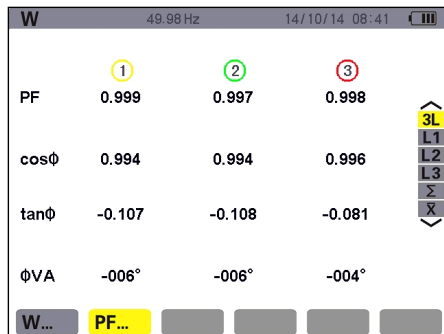
12.2.3 PF... Power Factor

Only when it displays 3-phase, the instrument will display the **PF...** icon, press the corresponding yellow function key to display relevant information.



12.2.4 3-phase sum of power consumption

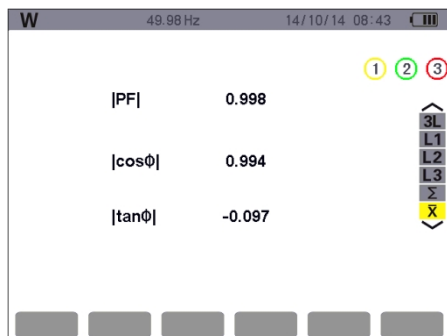
Select the button Σ in the right of the screen



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12.2.5 3-phase arithmetic mean

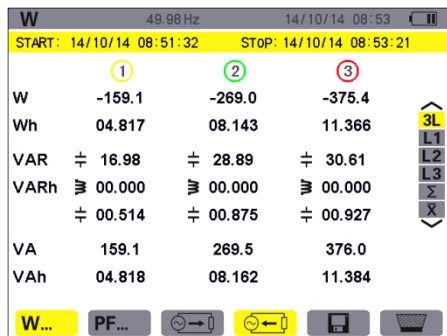
Select the button $\bar{X}$ in the right of the screen to display 3-phase arithmetic mean of power factor, displacement power factor, and tangent.



12.2.6 Power Generation

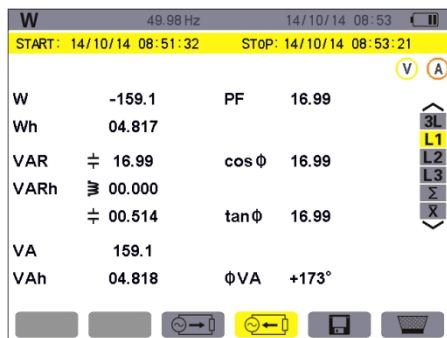
Display active power, reactive power, apparent power, active energy, reactive energy, and apparent energy

3L Power Generation



SECTION 12

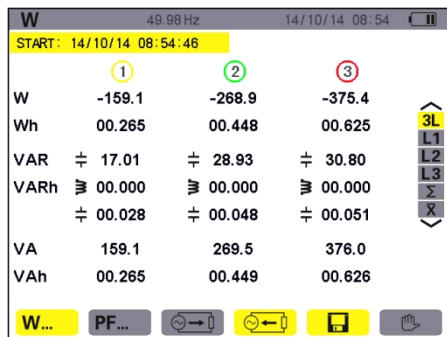
L1 Power Generation



Note: The display of L2, and L3 is similar to L1.

12.2.7 Start time of calculating power and energy

Press the corresponding yellow button to select the  icon to start calculation.



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12.2.8 Stop time of calculating the power and energy

Press the corresponding yellow button to select the  icon to stop calculation.

W		49.98 Hz	14/10/14 08:55	
START: 14/10/14 08:54:46		STOP: 14/10/14 08:55:25		
				
W	-159.1	-268.8	-375.4	
Wh	01.723	02.913	04.067	
VAR	± 17.00	± 29.12	± 30.63	
VARh	≡ 00.000	≡ 00.000	≡ 00.000	
	± 00.184	± 00.314	± 00.331	
				
				
VA	159.1	269.5	376.0	
VAh	01.723	02.919	04.073	
     				

12.2.9 Power and Energy reset to zero

Press the corresponding yellow button to select the  icon to reset the energy to zero, when it is highlighted in yellow , it indicates it is ready to delete, then press the corresponding yellow button to select the  icon to cancel the deletion.

When it is ready to delete, press the  key, and all consumed or generated energy values will be reset to zero

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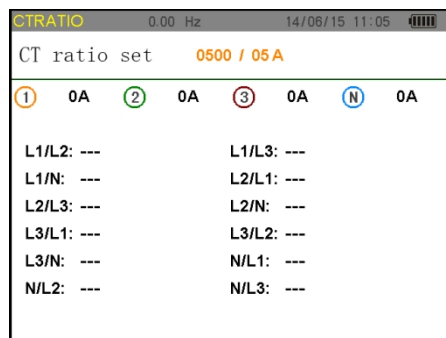
Turn Ratio Mode

The main function of CT transformation ratio mode: online measurement of the current transformer in operation, the primary and secondary current of the transformer, and the transformation ratio.

It can measure up to four channels of current at the same time. Different current sensors or current clamps can be selected.

13.1 CT Turn Ratio Interface

- Real-time values for four channels of current
- Turn Ratio Setting
- Turn Ratio Display

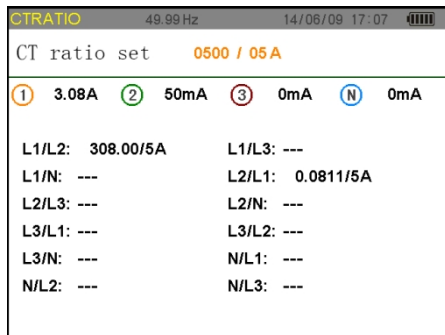


13.2 Turn Ratio Setting

Press the  key to set the turn ratio, press the     arrow

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key to adjust the value, and then press the  or  key to confirm. The turn ratio is based on 5A by default. When any current is 0, it will display ---.



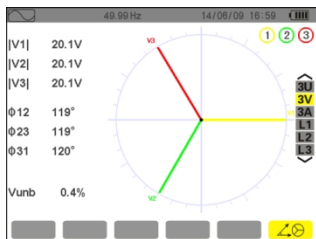
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Phase Mode

Press the **PHASE** key to enter phase mode. It displays the absolute value, phase and unbalanced degree of the voltage or current at the fundamental frequency, and the corresponding vector diagram.

14.1 3V Vector Diagram

It displays the absolute value of the phase voltage at the fundamental frequency, the phase angle of the phase voltage relative to the current and the unbalance of the phase voltage.

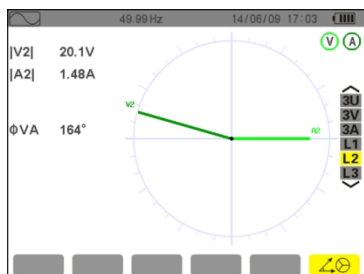


The display of 3U, and 3A Vector Diagram is similar to 3V Vector Diagram.

14.2 L1 Vector Diagram

It displays the absolute value of the phase 1 voltage (V1) and current (A1) at the fundamental frequency and the phase angle(ϕ_{VA}) of the phase 1 voltage relative to the current.

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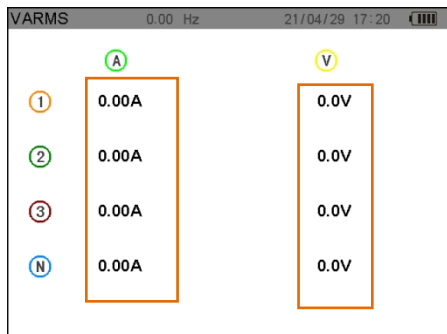


Note: The relevant information display of L2, and L3 is consistent with that of L1.

SECTION 15

Voltage and Current RMS Mode

Press the  key to enter **Voltage and Current RMS Mode**, it displays the effective values of four channels of currents and voltages.



SECTION 16

Snapshot Mode

Main Function :

- Capture up to 60 screen images for analysis and reference
- Show previously saved screenshots

Users can transfer saved screenshots to PC via USB.

16.1 Snapshot

Press and hold the  key for about 3 seconds to capture a screen, including , , , , , , ,

During screenshot, the  icon will replace the currently active mode icon , , , , , , and  at the top left of the screen.

When releasing the  key, the active mode icon reappears in the same location. At this point the instrument has saved the screen image.

Reminder: The instrument can store up to 60 screenshots. If the user wants to capture pictures again, first upload the required pictures to the computer via USB, then delete the screenshots in the instrument and capture new pictures.

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16.2 Function of Snapshot

Press the  key to enter the snapshot list.



16.2.1 Screenshot image list

Under any mode, the user can press the  key to directly enter the screenshot list to browse.

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16.2.2 Browse a screenshot

Step as follows:

- Press the  key, the instrument will display the  icon and snapshot list.
- Press the   or   key to select the screenshot to be displayed, and the time and date numbers of the selected screenshot will be displayed in bold.
- Press the  key to display the selected screenshot when the upper left of the screen will continuously display the  icon and the recording graph, eg, .
- Press the  key to return to the screenshot list.

16.2.3 Delete Screenshot Image

Step as follows

Display the screenshot list.

- Press the   or   key to select the screenshot to be deleted, the time and date of the selected screenshot will be displayed in bold.
- Press the corresponding function key to select the  icon. When it is highlighted in yellow , it indicates it is ready to delete, press the

SECTION 16

corresponding function key again to cancel deletion.

- When it is ready to delete, press the  key to confirm to delete the selected screenshot

SECTION 17

Temperature and HOLD

17.1 Temperature Interface

Press the  key to enter the temperature. It displays the current ambient temperature with three temperature settings, including Celsius, Fahrenheit, and Kelvin.

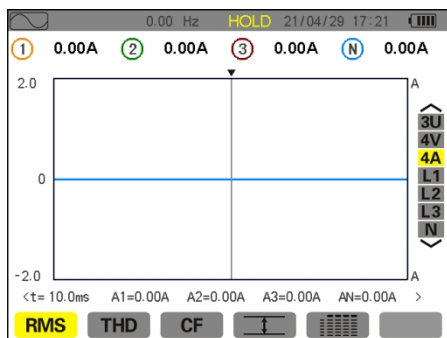


17.2 HOLD Mode

Under any test mode, press the  key to enter the HOLD mode to suspend the measurement, and the value at the moment of suspension will be displayed. When switching the mode or pressing the  key, the HOLD mode will be canceled. When entering the HOLD mode, the status bar at the

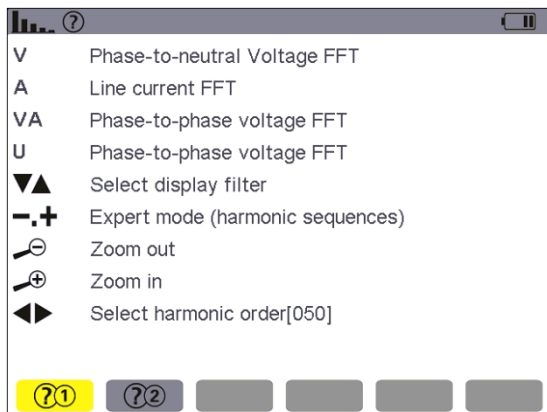
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top of the screen will display a yellow HOLD sign, and the yellow HOLD sign will disappear when the HOLD mode is canceled.



Help

Press the  key to learn about the information about the functions and symbols used in the current mode.



SECTION 19

Upload Data to the computer

- Copy the data from the CD to the computer via data transfer software;
- Connect the instrument to the computer with the USB cable and turn on the instrument;
- Click Power Quality Analyzer.exe on the computer to open the data software;
- Wait for the software to automatically search and connect the instrument.

Note:

- **The data in the instrument will not be deleted after being transferred to the PC.**
- **When the instrument is under detection, including trend graph recording, transient capture, inrush current or alarm detection, waiting or in progress, the PC cannot read the measurement data of the instrument.**

Battery Charging

- When the charger is used to connect the instrument to an external AC power source, the instrument will charge the internal rechargeable battery by itself.
- To ensure the safety and ensure the normal operation of the charger, be sure to turn off the power when replacing the rechargeable battery.
- Do not throw batteries into the fire
- Do not place the battery in an environment higher than 75 degrees.
- Do not short-circuit the battery.
- After the battery is fully charged, please unplug the charger if you do not use an external power supply.

2. Battery Replacement

 In order to ensure safety, it is recommended to use the original battery to replace it.

The steps are as follows :

- To eliminate the risk of electric shock, disconnect the power source and the connected equipment.
- Check whether shut down the instrument.
- Unscrew the screw on the rear cover of the instrument with a Phillips

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screwdriver, and open the rear cover of the instrument.

- Carefully take out the old battery and replace it with a new original battery.

Pay attention to the polarity of the battery. The end with the silk screen "+" on the circuit board under the battery slot is the positive pole.

- Cover the rear cover of the instrument and tighten the screws.
- Reboot to make sure the battery is installed.

SECTION 21

Packing List

21.1 Configuration and Accessories

No.	Items	Quantities
1	Instrument	1
2	Instrument Bag	1
3	Current Clamp	S-008, S-070, S-105, S-150, 4 for each, optional
4	S-200JF Rogowski Coil	4, standard
5	Test Lead	5, one for each color, yellow, green, red, blue, black
6	Crocodile Clip	5
7	Test Probe	5
8	12.6V 1A Charger	1
9	USB Cable Lead	1
10	USB	1
11	18650, rechargeable lithium battery, battery with protection board	9
12	32G Memory card	1
13	User Manual, Warranty Card, Certificate of Conformity	1

Optional Rogowski coils: S-100JF (100 mm) and S-300JF (300 mm).

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21.2 Weight

No.	Items	Weight
1	Instrument	Appro 1.6kg, including battery
2	S-008, optional	Appro 170g×4
3	S-070, optional	Appro 556g×4
4	S-105, optional	Appro 558g×4
5	S-150, optional	Appro 1.2kg×4
6	S-200JF, standard	Appro 325g×4, including battery
7	Test Lead/Charger	Appro 900g
8	Total Weight	Appro 15kg, including package

Note:

- We are not responsible for other damages caused by the use of this product.
- The contents of this user manual do not justify the use of the product for special purpose.
- The Company reserves the right to modify the contents of the user manual. In the case of modification, no further notice will be given.

