UNI-T®

UT285C

Operating Manual

Power Quality Analyzer

UNI-T®
UNI-TREND TECHNOLOGY（CHINA）CO., LTD.
No.6, Gong Ye Bei 1st Road,
Songshan Lake National High-Tech Industrial
Development Zone, Dongguan City,
Guangdong Province, China
Tel: (86-769) 8572 3888
http://www.uni-trend.com

P/N:110401110254X
2023/12/05

⚠ Warning ⚠

Thank you for purchasing **UT285C Power Quality Analyzer**. To better use this product, please be sure to:
----**Read this user manual thoroughly.**
----**Comply with the safe regulations and operating cautions strictly in this manual.**

◆ **Failure to comply with follow precautions may cause electric shock, explosion, or fire.**
★ Under any circumstance, please pay special attention on safety in using this device.
★ Pay attention to words and symbols affixed on the panel and back cover of the device.
★ This device must be used, disassembled and repaired by authorized professionals.
★ If continuous use of this device is dangerous to the user, please stop use immediately and seal the device, and then send it to authorized body for maintenance.
★ The danger symbol in manual " ⚠ " indicates that users must perform safe operation in compliance with the manual instructions.
★ The extreme danger symbol in manua ⚡ " indicates that users must perform safe operation strictly in compliance with the manual instructions.
★ Before removing and replacing the battery or the SD-Card, please power off the device and disconnect it from tested line, current sensor, power adaptor.
★ Current clamp must be connected with the device correspondingly, otherwise the test error may be increased.
★ Please do not use the device if the battery or SD card slot is missing, damaged or improperly installed.
★ The founder and operator of the system shall be responsible for any system security problems unrelated to this Analyzer.
★ For safety, please use only the wires and accessories supplied with the Analyzer (in accordance with the standard of IEC61010-031(2002)). When a sensor or accessories in low-voltage class are connected to the device, which must be applicable to the system of this device.
★ Please always check test leads, current clamps and accessories are in optimum condition before use. Any wire, current clamp or accessory with damaged insulation (or even partially damaged) must be repaired or scrapped.
★ Comply with the environmental condition (refer to 15.3.1)
★ Please use personal safety equipment when necessary.
★ The Analyzer should be used in devices with AC/DC voltage to ground not greater than CAT IV 600V (IEC61010-1 standard), or used in devices with voltage not greater than CAT III 1000V. It is forbidden to use for power grids or measurement category with higher voltage.
★ Use only the power adapter or battery pack supplied by the manufacturer, which is designed in accordance with specific safety rating.
★ Please comply with the safety rating for the accessories or current clamp. Do not make connection with any unused terminals.
★ Some current clamps cannot be installed to or removed from exposed conductors under the dangerous voltage.

◆ **Usage & Connection Step:**
★ Start up the Analyzer.
★ Set the relevant parameters of the Analyzer according to the desired results and the network type.
★ Connect the voltage test leads and current sensors to the Analyzer.
★ Connect the ground line and/or neutral line of the voltage test leads to the ground line and/or neutral line of the power grid.
★ Connect the neutral line of current sensor to the neutral line of power grid.
★ Connect the L1 phase lead to the L1 phase of power grid and the corresponding current sensor clamp to the phase L1 of power grid.
★ Repeat the above connection steps for phases L2, L3.
Note: Complying with this operation procedure reduces connection errors to minimum and avoids wasting time.

◆ **Disconnection Steps:**
★ Disconnect the wiring in reverse order (disconnect the ground line or neutral line at last in general).
★ Remove all the leads of the Analyzer and shut it down.
★ Charge the battery and upload the test data when necessary.
USB is used for data transmission. Battery can be charged by the supplied special adapter.

◆**Dotted Ends Of The Current Clamp**
★ The side with current clamp marks (L1, L2, L3, N/D or has red dot) is the current noninverting input end, which is dotted end.

★ The side of 008B current clamp has red dot is the current noninverting input end, that is dotted end.
★ The side of 040B, 068B current clamp without screws is the current noninverting input end, which is dotted end.
★ The side with the lock symbol “ 🔒 ” of the 300F flexible current sensor as the current noninverting input end, that is dotted end.

CONTENT

1. OVERVIEW

1.1. Introduction

UT285C Power Quality Analyzer is a three-phase, multifunctional and intelligent Analyzer specially designed for on-site tests. It is characterized by large LCD, high resolution, interface in both English and Chines, shock proof, etc. UT285C can simultaneously measure the followings: 4-channel current (ABC three-phase and neutral wire current), 4-channel voltage (ABC three-phase voltage and neutral line voltage to ground), peak value of current and voltage, maximum/minimum value over a period, three-phase imbalance factor, short-time voltage flicker, transformer K factor, active power, reactive power, apparent power, power factor, displacement power factor, active electrical energy, reactive electrical energy, apparent electrical energy, harmonic ratio, total harmonic distortion, etc. This Analyzer is able to display real-time waveform, phasor diagram, harmonics ratio bar chart of current and voltage. UT285C has multiple functions including capturing the instantaneous change of voltage and current dynamically, monitoring starting current and power parameters, recording test data for a long time, generating alarm list and trend chart, and more.
For electrical applications nowadays, more and more complex faults occur at large-scale electrical equipment and power girds, thus it is difficult to troubleshoot such complex problems. As the requirements for the power quality of grid become increasingly strict in various industries, we design a power quality Analyzer that can troubleshoot electrical system rapidly and accurately, and that is capable of monitoring and analyzing the parameters of power quality comprehensively and systematically.

UT285C Power Quality Analyzer adopts the DSP + ARM (dual processors) architecture. The DSP is used for data collection and algorithmic processing; while the ARM is used for communication protocol and processing of man-machine interface. Simultaneous 4-channel analog signal acquisition is achieved by 2 pieces of AD7655 (resolution: 16 bits) of the ADI company. The highest sampling rate that the Analyzer can reach is 1 MSPS, which ensures the accuracy of the channel and the information integrity, and ensures that any transient changes are not missing in the power grid, and makes the detection of transient waveform, surge and undervoltage, instantaneous interruption more. The DSP working frequency is over 200 MHZ, which enables the Analyzer to monitor the power grid in time, and to dynamically adjust the sampling rate to be synchronous with the industrial frequency. The Analyzer is designed with a 5.6-inch color screen with resolution of 640 dots x 480 dots, and displays the parameter, waveform, phasor diagram, and harmonic ratio for each phase by using different colors, so that the state of parameters of power grid can be understood visibly and efficiently. The built-in flash memory can store 60 groups of screenshots at the same time, 150 groups of captured transient voltage/current waveforms, and 12800 groups of alarm lists. In the starting current detection model, the Analyzer can continuously capture starting current waveform for 100 s. The built-in 2G memory is used to store the trend curve records, and has the ability to simultaneously record 20 parameters (adjustable), with recording performed once per minute and trend curve records stored for 300 days.

Power Quality Analyzer is also called Intelligent Three Phase Power Quality Analyzer, Multifunctional Power Quality Analyzer, and so on. It has functions of harmonic Analyzer, phase volt-ampere meter, electric parameter tester, and is applicable to electricity industry, petrochemical, metallurgy, railway, mining enterprises, scientific research institution, and metrological department. It is particularly suitable for comprehensive analysis and diagnosis on all the voltage, current, power, power, harmonic, and phase electric parameters.

1.2. Function

1.2.1. Basic function

★ Real-time display of waveform (4-channel voltage/4-channel current).
★ True RMS values of voltage and current.
★ The DC components of voltages.
★ Peak current and voltage values.
★ Minimum and maximum half-cycle RMS current and voltage values.
★ Phasor diagram display.
★ Measurement of each harmonic up to 50th order.
★ Bar charts show harmonic ratios of current and voltage of each phase.
★ Total harmonic distortion (THD).
★ Active/reactive/apparent power and total value of each phase.
★ Active/reactive/apparent energy and total value of each phase.
★ Transformer K factor.
★ Power factors (PF) and displacement factors (DPF or COSΦ).
★ Short-term voltage flicker (PST).
★ Three phase unbalance (current and voltage).

1.2.2. Capture record function

◆Transient capture function

The Analyzer can capture and detect the instantaneous changes of the voltage and current parameters of power grid, including voltage & current fluctuation, voltage & current surge and sags, short time interruption, transient overvoltage, impulse current, current & voltage instantaneous distortion. The Analyzer can store 150 groups of transient waveforms at the same time.

◆Starting current monitoring

The Analyzer can monitor the surge current of the circuit and the starting current of the electrical equipment when it is started, which facilitates the design of the installed capacity correctly. It can display the rise/fall curve of the RMS during the starting process, the envelope curve of the starting current, the waveform of 4-channel current and 4-channel voltage. After triggering, it can record for about 100s, and store all the instantaneous values and waveform curve of the current & voltage in each period within 100s.

◆ Trend chart record and store function

For all the test parameters of basic test functions (Urms, Uthd, Ucf, Uunb, Hz, Vrms, Vthd, Vcf, Vunb, PST, Arms, Athd, Acf, Aunb, KF,W, VAR, VA, PF, COS , TAN), 50th harmonic of voltage, 50th harmonic of current, total 123 parameters are recorded and the trend curve can be created. Data can be recorded for a long time if needed. (Simultaneously select 20 kinds of parameters to record data for once every one minute, can record about 300 days).

◆Alarm function

The limit value can be set for the selected parameter, to monitor if overrange occurs. Alarm log will be created if the limit value is exceeded. For overvoltage, current overflow, unbalance degree over range, a harmonic ratio over range, frequency over range, active power over range, total harmonic distortion over range, and others, maximum 40 groups of alarm monitoring parameters can be set. Different monitoring parameters (including 50th harmonic, with 123 different parameters totally) and limit values can be set for each group. The minimum time of overrange can be set. The Analyzer can store up to 12,800 groups of alarm records.

◆Screenshot function

In any testing screen, the present screen can be captured and stored, at the same time automatically store the record time and test mode is automatically saved at the same time. For example, voltage & current waveform, harmonic bar chart, phasor diagram and others can be saved. The Analyzer can save a maximum of 60 groups of screenshots.

1.2.3. Other functions

◆Communication function

By communicating with computer via USB cable, the monitoring software can display the waveform in the power quality analyzing test in real time, read the detected and captured transient waveform, trend chart records, alarm logs, screenshots and more and display them on the computer.

◆Setting function

The wiring method of the Analyzer and the type of power grid can be set.
Different current clamps and different voltage test ratios can be selected.
Chinese menu or English menu can be selected.

◆Help menu in Chinese/English

Relevant information can be obtained by pressing the “Help” key in each step of operation.

1.3. Technical Specification

1.3.1. Basic condition and working condition

Influence Factor	Test Item	Basic Condition	Working Condition
Environment Temperature	All parameters	(23±2)°C	-10°C~ 40°C
Relative Humidity	All parameters	40%~ 60%	<80%
Phase Voltage	All parameters	(100±1%)V	1.0V~ 1000V
Line Voltage	Test true RMS of line voltage	(200±1%)V	1.0V~ 2000V
Current	Test true RMS of current	(5±1%)A	10mA~ 6000A
Power grid Frequency	All parameters	50Hz±0.1Hz	40Hz~ 70Hz

Phase Difference Between the current and voltage	Test active power and active energy	Cos =1	Cos : 0.2~ 1.0
	Test reactive power and reactive energy	Sin =1	Sin : 0.2~ 1.0
Harmonic	All parameters	<0.1%	0.0%~ 100%
Voltage Unbalance	All parameters	<10%	0.0%~ 100%
Working Voltage	All parameters	DC9.8V±0.1V	DC9.5V~ 10.5V
External electric Field, Magnetic Field	All parameters	Should be avoided	
The Tested Wire Position	Measured related parameters of current	Tested wire at the center of clamp.	

1.3.2. General specification

Power Supply	Rechargeable lithium-ion battery packs 9.6V, external charger.
Battery Indicator	Battery symbol shows power energy. When the voltage is too low, the Analyzer shuts down automatically after 1 minute.
Working Current	About 490 mA. Working for 8 hours continuously.
Display Mode	LCD color screen, 640dots×480dots, 5.6 inches, display area: 116mm×88mm.
CT Size	008B small sharp current clamp: 7.5mmX13mm;(optional) 040B round current clamp: 35mmX40mm;(optional) **068B round current clamp: 68mmX68mm.** 300F flexible current sensor (with Integrator) : 300mm.(optional)
Analyzer Dimensions	L W H: 240mmX170mmX68 mm.
Number Of Channels	4 voltage channels & 4 current channels (4U&4I).
Line Voltage	1.0V~2000V.
Phase Voltage	1.0V~1000V.
Current	008B current clamp: 10mA~10.0A; 040B current clamp: 0.10A~100A; 068B current clamp: 1.0A~1000A; 300F flexible current sensor (with Integrator) : 10A ~ 6000A
Frequency	40Hz~70Hz.
Electricity Parameters	W, VA, Var, PF, DPF, cos , tan .
Energy Parameters	Wh, Varh, Vah.
Harmonic	Yes, 0^{th}~50^{th} order
Total Harmonic Distortion	Yes, 0^{th}~50^{th} order, each phase.
Groups Of Transient Records	150 groups
Voltage Flicker	Yes.
Starting Current Mode	Yes, 100 seconds.
3 Phases Unbalance	Yes.
Record	300 days (Recording 20 parameters simultaneously, with one point recorded for every 1 min).
Min/Max Recorded Value	Measurement of maximum and minimum values within a period of time.
Alarm	40 different kinds of parameter can be selected. There are 12,800 groups of alarm logs.
Peak	Yes.
Screenshot Store	60pcs
Menu Language	English
Communication Interface	USB.
Automatic Shutdown	In the alarm mode/trend chart record mode/transient capture mode (waiting or in progressing), the Analyzer will not shut down automatically.
	If there is no keystroke within 15 minutes in other test modes, the Analyzer will shut down automatically after one minute of prompt.

Backlight Function	Yes (Suitable for use at night and dark place)
Weight	Analyzer: 1.6kg (with battery).
	008B small sharp current clamp: 170gX4 (optional)
	040B current clamp: 190gX4 (optional)
	068B current clamp: 510gX4
	300F flexible current sensor (with Integrator) : 330gX4 (optional)
	Test wires and power adapter: 900g
	Total weight: about 9.2kg (with packaging).
Voltage Test Wire Length	3m.
Current Sensor Wire Length	2m.
Working Temperature And Humidity	-10°C~40°C; below 80%Rh.
Storage Temperature And Humidity	-10°C~60°C; below 70%Rh.
Input Impedance	Input impedance of test voltage: 1M .
Withstand Voltage	Withstand 3700V/50Hz sinusoidal AC voltage for 1 minute between the wiring and housing of the Analyzer.
Insulation	10M between the wiring and housing of the anaylzer
Structure	Double insulation, with insulated vibration-proof sheath.
Suitable Safe Standard	IEC 61010 1000V Cat III / 600V CAT IV, IEC61010-031, IEC61326, Pollution Degree 2.

1.3.3. Analyzer accuracy specification (excluding the current sensor)

The following data are respectively introduced according to the basic conditions and on the base of an ideal current sensor (completely linear and without phase shift).

Measurement	Range	Display Resolution	The Max Error In Reference Range
Frequency	40Hz~ 70Hz	0.01Hz	±(0.03)Hz
Phase Voltage True RMS	1.0V~ 1000V	Min resolution 0.1V	±(0.5%+5dgt)
Line Voltage True RMS	1.0V~ 2000V	Min resolution 0.1V	±(0.5%+5dgt)
DC Voltage	1.0V~ 1000V	Min resolution 0.1V	±(1.0%+5dgt)
Current True RMS	10mA~ 6000A	Min resolution 1mA	±(0.5%+5dgt)
Peak Of Phase Voltage	1.0V~ 1414V	Min resolution 0.1V	±(1.0%+5dgt)
Peak Of Line Voltage	1.0V~ 2828V	Min resolution 0.1V	±(1.0%+5dgt)
Current Peak	10mA~ 6000A	Min resolution 1mA	±(1.0%+5dgt)
Peak Factor	1.00~ 3.99	0.01	±(1%+2dgt)
	4.00~ 9.99	0.01	±(5%+2dgt)
Active Power	0.000W~ 9999.9kW	Min resolution 0.001W	±(1%+3dgt) Cos 0.8
			±(1.5%+10dgt) 0.2 Cos <0.8
Reactive Power Inductive & Capacitive	0.000VAR~ 9999.9kVAR	Min resolution 0.001VAR	±(1%+3dgt) Sin 0.5
			±(1.5%+10dgt) 0.2 Sin <0.5
Apparent Power	0.000VA~ 9999.9kVA	Min resolution 0.001VA	±(1%+3dgt)

Power Factor	-1.000~ 1.000	0.001	±(1.5%+3dgt) Cos 0.5
			±(1.5%+10dgt) 0.2 Cos <0.5
Active Energy	0.000Wh~ 9999.9MWh	Min resolution 0.001Wh	±(1%+3dgt) Cos 0.8
			±(1.5%+10dgt) 0.2 Cos <0.8
Reactive Energy Inductive & Capacitive	0.000VARh~ 9999.9MVARh	Min resolution 0.001VARh	±(1%+3dgt) Sin 0.5
			±(1.5%+10dgt) 0.2 Sin <0.5
Apparent Energy	0.000VAh~ 9999.9MVAh	Min resolution 0.001VAh	±(1%+3dgt)
Phase Angle	-179°~ 180°	1°	±(2°)
Tanφ (VA≥50VA)	-32.76~ 32.76	Min resolution 0.001	:±(1°)
Phase Difference Of Power Factor(DPF)	-1.000~ 1.000	0.001	:±(1°)
Voltage Harmonic Ratio 1st-50th order (Vrms>50V)	0.0%~ 99.9%	0.1%	(1st～20th order)±(1%+5dgt) (21st～30th order)±(1%+10dgt) (31st～50th order)±(1%+15dgt)
Voltage Harmonic Angle (Vrms>50V)	-179°~ 180°	1°	±(3°) harmonics for 1st – 25th order
			±(10°) harmonics for 26th – 50th odrer
Current Harmonic Ratio 1st -50th order (Arms>I_{range}/100)	0.0%～99.9%	0.1%	(1st～20th order)±(1%+5dgt) (21st～30th order)±(1%+10dgt) (31st～50th orde)±(1%+15dgt)
Current Harmonic Angle (Arms>I_{range}/100)	-179°～180°	1°	±(3°) harmonics for 1st – 25th order ±(10°) harmonics for 26th – 50th order
Total Harmonic Ratio (THD or THD-F)≤50	0.0%~ 99.9%	0.1%	±(1%+10dgt)
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 Phases Unbalance	0.0%~ 100%	0.1%	± (1%)

1.3.4. Current sensor character

Current Sensor Type	Current True RMS	Range	Max Resolution	Max Error Of Current True RMS	Max Error Of Phase Angle φ
008B current clamp	10mA~ 99mA	10.0A	1mA	±(1%+3dgt)	±(1.5°),Arms 20mA
	100mA~ 10.0A			±(1%+3dgt)	±(1°)
040B current clamp	0.10A~ 0.99A	100A	0.01A	±(1%+3dgt)	±(1.5°)
	1.00A~ 100A			±(1%+3dgt)	±(1°)
068B current clamp	1.0A~ 9.9A	1000A	0.1A	±(2%+3dgt)	±(3°)

	10.0A~ 1000A			±(2%+3dgt)	±(2°)
300F flexible current sensor (with Integrator)	10A～99A	6000A	1A	±(1 % + 3dgt)	±(3°)
	100AA~6000A			±(1 % + 3dgt)	±(2°)

Note: Please connect the current clamp to the Analyzer with corresponding wiring. Do not make reverse connection. The direction of same-polarity end of the current clamp:

★The side of current clamp marking L1, L2, L3, N/D or with red dot is the in-phase current input end, that is, the same-polarity end.

★The side of 008B current clamp with red dot is the in-phase current input end, which is the same-polarity end.

★The side of 040B, 068B current clamp without screws is the in-phase current input end, that is, the same-polarity end.

★The side with the lock symbol"🔒" of the 300F flexible current sensor is the in-phase current input end, that is, the same-polarity end.

2. Accessories

2.1. Standard Configuration

No.	Designation	Quantity
1	Analyzer	1 unit
2	Carrying bag	1 pcs
3	Current sensors 008B	4 pcs (optional)
4	Current sensors 040B	4 pcs (optional)
5	Current sensors 068B	4 pcs
6	300F flexible current sensors (with Integrator)	4 pcs (optional)
7	Testing wires.	5 pcs (yellow, green, red, blue, black)
8	Crocodile clips.	5 pcs
9	Test probe.	5 pcs
10	Power adapter.	1 pcs
11	USB communication cable	1 pcs
12	Lithium battery pack.	1 (Built into the Analyzer)
13	2GB memory card	1 pcs(Plug in the Analyzer)
14	Manual	1 pcs

2.2. Analyzer Weight

No.	Designation	Weight
1	Analyzer	1.6Kg (with battery).
2	008B small sharp current clamp sensor.	170gX4.
3	040B current clamp sensor.	190gX4.
4	068B current clamp sensor.	510gX4.
5	300F flexible current sensor (with Integrator)	330gX4.
6	Test wires and power adapter.	900g.
7	Total weight.	9.2kg (with packaging).

Figure 2-1: All Accessories (including optional ones)

3. Introduction to the Analyzer

3.1. Overall View

Figure 3-1: Analyzer appearance

3.2. Power On/Off Key

Press the key (red) to start the Analyzer.

The power of the Analyzer can be supplied by battery independently (rechargeable battery) or specific power adapter.

Press the key again to shut down the Analyzer. Please make confirmation before shutdown if the Analyzer is in recording mode, transient capturing mode, or alarm detection mode.

3.3. Display Screen

3.3.1. Introduce

The backlit LCD (640×480) can display measurement value and curves diagram, device parameters, selection curves, instantaneous values of the signals, and measurement mode.

When the device is powered up, it automatically displays the waveform mode screen. For more information about this screen, please refer to section §8.

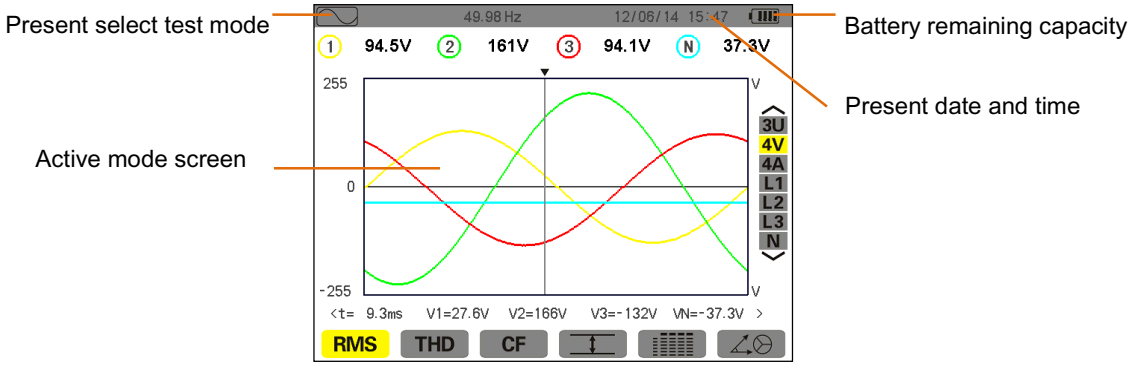


Figure 3-2: Screen display figure

Automatic shutdown: When the Analyzer is not in any state of trend chart recording, transient capture, starting current detection or alarm detection (waiting or in progressing), the Analyzer will automatically shut down if there is no keystroke within 15 minutes.

3.3.2. Symbol

The screen displays symbols as below:

Symbol	Designation	Symbol	Designation
V	Phase voltage		Display voltage and current RMS values and extrema.
U	Line voltage		Simultaneous display all voltage and current measurement value
A	Current		Display voltage and current vector diagram
VA	Apparent power		Energies consumed
	Zoom in		Energies generated
	Zoom out		The 1st page of Help
	The waveform of X axis cursor indicator		The 2nd page of Help
PF…	Display value of PF, DPF, Tan .		The 3rd page of Help
W…	Display value of powers and energies		The 1st group monitoring parameter of trend mode
	Start Recording		The 2nd group monitoring parameter of trend mode
	Recording list		The 3rd group monitoring parameter of trend mode
OK	Confirm		The 4th group monitoring parameter of trend mode
	Stop		Page up
	Delete		Page down

3.4. Analyzer Keys

3.4.1. Function keys (yellow keys)

F1 F2 F3 F4 F5 F6 yellow function keys, corresponding function displayed on the LCD screen above the keys.

3.4.2. Navigation keys

Four arrow keys, one confirm key and one return key constitute the menu of navigation module.

Key	Function
	Up direction or increase
	Down direction or reduce
	Right direction(page down)
	Left direction(page up)
	Confirm

	Return

3.4.3. Test Mode Keys (6 keys)

Press the mode key to enter into the corresponding test mode:

Key	Corresponding Test Mode	Detail Chapter
	Waveform mode: display of voltage and current waveform, max and min value, extreme value, summary tables of each parameter measurement value, voltage and current vector diagrams.	§ 8
	Harmonic mode: display of voltage, current, and apparent power harmonic ratios (displayed in a graph), harmonic RMS value, phase shift with respect to the fundamental.	§ 7
W	Power and energy mode: displays the active power, the reactive power, the apparent power, power factor, phase shift of power factor, etc.	§11
	Trend mode: recording of the parameters selected in the *Configuration* menu.	§10
	Alarm mode: listing of recorded alarms exceeding the thresholds programmed in the configuration; recording of network blackouts with half-cycle resolution (Vrms, Arms, Urms), determination of energy consumption overshoots, monitoring of compliance with a power supply quality contract.	§9
	Capture mode: monitoring instantaneous change of the voltage and current parameters of power grid, including the voltage current fluctuations, voltage current surge, sag and short supply interruption, temporary overvoltage, impact current and current voltage instantaneous distortion.	§ 6

3.4.4. Other keys

The other keys with following functions:

Item	Function	Detail Chapter
	Setting key: Analyzer setting and capture mode parameter setting, can setting date and time, display, type of connection to the network, voltage ratio, current sensor select, choice of thresholds to be detected, definition of alarms to be detected, choice of parameters to be detected.	§5
	Snapshot mode: snapshot of current screen and retrieval of screens already stored.	§12
	Help key: provides information about the functions and the symbols used for the current display mode.	§13

3.5. Wiring

3.5.1. Measurement connectors

The wire connectors are located on the top of the Analyzer. These connectors are distributed as follows:

Figure 3-3: The connection port on the top

3.5.2. Charge interface & USB interface

Use only the dedicated power adapter and USB communication cable supplied with the Analyzer.

3.6. Power Supply

3.6.1. Battery level indication

The battery symbol is at the top right corner of the screen and can show the battery level. The number of bars indicates the current battery level.

Symbol	Charge State
	Battery fully charged

	Low battery
	Moving bars: battery charging
	The Analyzer is powered from an external power supply (the battery is fully charged)

If the battery power is too low, the Analyzer will display the following message “Low battery! The Analyzer will turn OFF soon”. If the Analyzer is not charged by connecting the dedicated power adaptor in time, the Analyzer will shut down after one minute.

3.6.2. Battery working time

The working time of battery is 8 hours when the battery is fully charged.

3.6.3. Recharge the battery

The battery is charged by the supplied special power adapter. The power charging connector is shown in Figure 3-3. Please charge the battery using use the supplied special adaptor that meets the safety standard. For battery without power, please charge it for about 5 hours. After charging is completed, the Analyzer will use the external power supply first and not consume the rechargeable battery power. The charger indicator light is on to indicate that the battery is charging, and the charger indicator light is off when the battery is fully charged.

3.6.4. The battery

Special lithium battery (9.6V), 4,500 mAh. The battery is built in the battery compartment.

3.6.5. Power supply by special power adapter

When the Analyzer is running from the dedicated power adapter, the battery is optional. However, there is a risk of data loss if the main power supply is cut off during recording (when no battery is available).

3.7. The Bracket

The retractable bracket (Figure 3-4) on the back of the Analyzer keeps the Analyzer at an angle of 60°.

Figure 3-4: Battery cover and bracket (the Analyzer back side structure)

3.8. Functions Summary

3.8.1. Measurement functions

- The AC voltage value between the devices (up to 1000V).
- The AC current value (including neutral wire, up to 1000A).
- Sustaining voltage and current value (including neutral wire).
- Minimum and maximum half-cycle RMS value of voltage and current.
- Peak of voltage and current (including neutral wire).
- Power grid of 50 Hz or 60 Hz.
- The peak factor of voltage and current (excluding neutral).
- Calculation of the K factor (KF) (applied to calculate the harmonics current of transformers).
- Current and voltage distortion factor (DF) (excluding neutral).
- The total harmonic distortion of voltage and current (excluding neutral).
- Active power, reactive power (capacitive and inductive), apparent power of each phase (excluding neutral).
- Power factors (PF) and phase different power factors (DPF) (excluding neutral).
- Short-term voltage flicker (PST) (excluding neutral).
- Active, reactive (capacitive and inductive), and apparent energy (excluding neutral).
- Current and voltage harmonics (excluding neutral) up to 50^{th} order: harmonic ratio, RMS value, minimum and maximum, and sequence harmonics.
- Apparent power harmonic (50^{th} order): harmonic ratio, RMS value, minimum and maximum.
- The starting current and surge current of motor.

3.8.2. Main functions

- Displaying waveform (voltage and current).
- "Starting Current" function: displays the parameters used to study the motor starting.
  - ★Instantaneous current value at which the cursor points.
  - ★Maximum instantaneous current value (the whole starting time).
  - ★The semi-period current TRMS value of the cursor point.
  - ★Maximum semi-period current TRMS value (the whole starting time).
  - ★The motor starting time.
- Screen shot (60 groups maximum).
- Transients function. Detect and record transient event records of power grid parameters in a period of time (set the start and end times of the detection schedule) (up to 150 groups), store 4 complete period (Before transient triggering: 1 period; After triggering: 3 periods).
- Trend diagram record function (2GB memory card which with the time, date, the start and end time of setting record--- max can record 100 groups). With histogram or curve shows the recorded parameters values and averages in chronological order.
- Alarm function. Alarm record log (up to 12,800 groups) (triggered according to the setting threshold value); Set the start and end times of alarm monitoring; Displays the trigger channel of the alarm, the maximum and minimum value after the trigger, and the duration.

3.8.3. Setting function

- Date and time setting.
- Screen brightness and contrast setting.
- Choice of curve colors.
- Choice of reactive power and reactive energy calculation mode (with or without harmonics).
- Choice of wirings of power grid (single-phase, split-phase, 3-phase 3 wires or 3-phase 4-wires, 3-phase 5-wire).
- Choice of voltage measurement ratio and current clamp sensors.
- Transient monitoring of voltage and current trigger threshold setting.
- Monitoring parameters of trend diagram setting.
- Choice of alarm monitoring parameters, trigger threshold setting.
- Data delete (total or partial).
- Display the Analyzer software and hardware version numbers.
- Choice of language (Chinese/English).

3.9. Abbreviations

Meanings of the symbols and abbreviations used:

Symbol	Designation	Symbol	Designation
⩙	AC and DC components	**MAX**	Maximum true RMS
~	AC component only	**MIN**	Minimum true RMS
⎓	DC component only	**ms**	Millisecond (unit)
φ	Phase angle	**PEAK**	Voltage & current maximum (+) or minimum(-) peak
⫗	Inductive phase shift	**PF**	Power factor
⫘	Capacitive phase shift	**PST**	Short-term voltage flicker
°	Degree	**RMS**	True RMS value (current or voltage)
∑	Sum of each phase values	**t**	Time
L	Phase (line)	**Tan**	Tangent
%	Percentage	**THD**	Total harmonic distortion
A	Ampere	**Ucf**	Line voltage peak factor
Acf	Current peak factor	**Uh**	Line voltage harmonic
Ah	Current harmonic	**Urms**	Line voltage true RMS
Akf	K Factor (for transformers)	**Uthd**	Line voltage total harmonic distortion

Arms	Current true RMS	**Uunb**	Line voltage unbalance (3)
Athd	Total harmonic distortion of current	**V**	Phase voltage
Aunb	Current unbalance (3)	**VA**	Apparent power
AVG	Average value.	**Vah**	Apparent energy
CF	Peak factor (current or voltage).	**VAR**	Reactive power
DC	DC component (current or voltage).	**VARh**	Reactive energy
DPF	Displacement power factor	**Vcf**	Voltage peak factor
Hz	Power grid frequency	**Vrms**	Phase voltage true RMS
KF	Refer to Akf	**Vthd**	Voltage to neutral total harmonic distortion
W	Active power	**Vunb**	Phase voltage unbalance (3)
Wh	Active energy		

4. USE

The Analyzer must be set up before it can be used. Please refer to Chapter 5 of this manual for setting content. Please comply with the following precautions when using the Analyzer:

- Do not measure voltage to earth exceeding 1,000V RMS.
- Before installing or removing the rechargeable battery, please ensure that the Analyzer is disconnected from any test wires and shut down.

4.1. Start-Up

Press the key to start up the Analyzer.
After about 3 seconds, the Waveform screen is displayed.

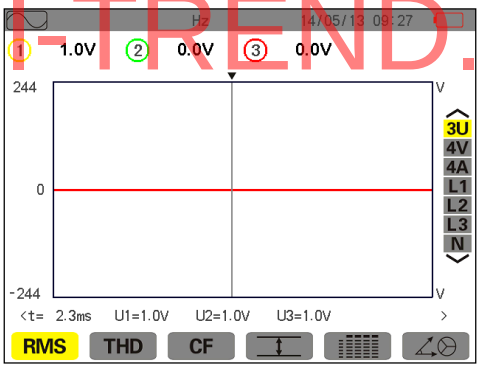


Figure 4-1: Waveform screen

When the battery power is full, the power of the Analyzer is supplied by battery. If not, the Analyzer will display the alarm message “Low battery! The Analyzer will turn OFF soon” (refer to § 3.6). The power of the Analyzer can be supplied by the special external power source (figure 3-3), without the use of battery.

4.2. Setting

To set the configuration parameters and test parameters of the Analyzer, please proceed as follows:
★ Press key, then the Analyzer displays the setting interface.
★Press or key to select the parameter to be modified, then press to enter the sub-menu.

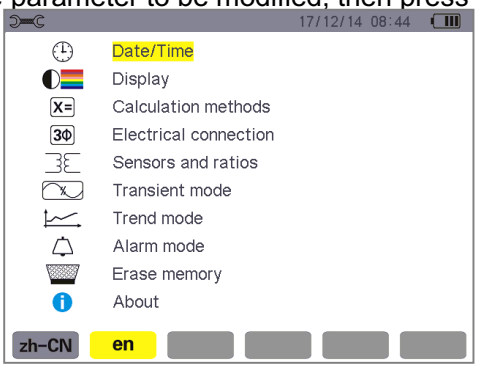


Figure 4-2: Setting screen

Press ▲ or ▼ and ◄ or ► to browse and press ↵ key to confirm in the displayed sub-menu. For specific operations, please refer to §5.3–§ 5.10.

Note: The following points must be checked or adjusted for each measurement:

Function	Reference
Define the parameters calculation methods.(reactive power/ reactive energy)	§5.5
Select the type of wiring (single- phase ~ three-phase, five-wire)	§5.6
Select voltage ratios and current clamp sensor type	§5.7
Transient triggering threshold (transients mode)	§5.8
Parameters to be recorded (trend mode)	§5.9
Definition of alarm thresholds	§5.10

Press ESC to return to the configuration menu screen.

4.3. Wire Connection

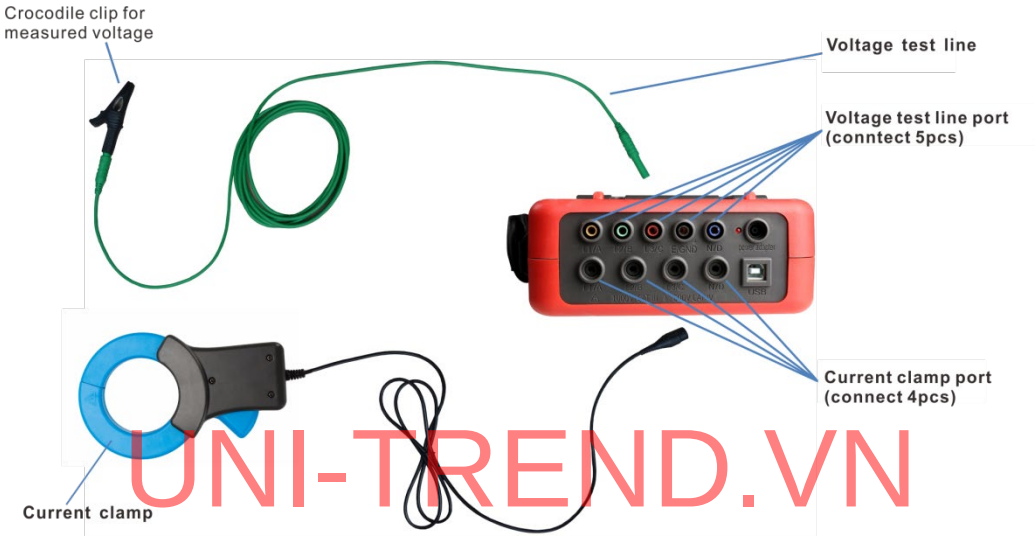


Figure 4-3 test connection on the top of device

Connect the measurement lines to the device as follows:

- Current measurement: Connect the 4 current clamps to 4-channel current interfaces of L1/A, L2/B, L3/C, N/D correspondingly. To ensure accurate measurement, please connect the current clamps correspondingly. Select the applied current clamp before measurement (see § 5.7).
- Voltage measurement: Connect the 5 voltage test wires to the 5 voltage input interfaces of L1/A, L2/B, L3/C, E/GND, N/D correspondingly. Set the voltage ratio before measurement (see § 5.7).

The measurement line should be connected to the tested circuit as shown in the following diagrams.

4.3.1. Single-phase power grid

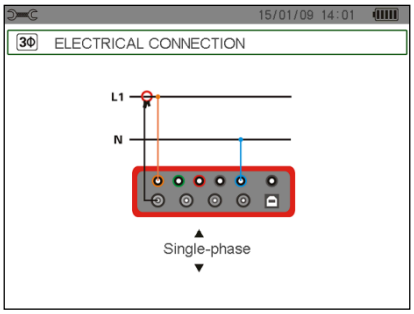


Figure 4-4: Single-phase connection

4.3.2. Three-phase 3-wire power grid

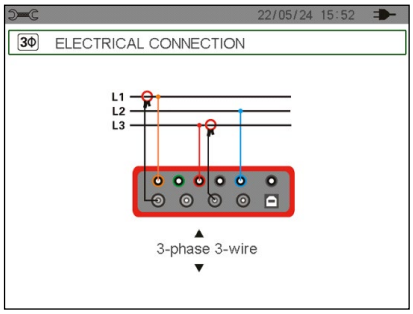


Figure 4-5: 3-phase 3-wire connection

4.3.3. Three-phase 4-wire power grid

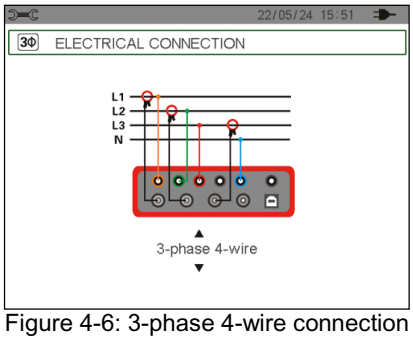


Figure 4-6: 3-phase 4-wire connection

4.3.4. Three-phase 5-wire power grid

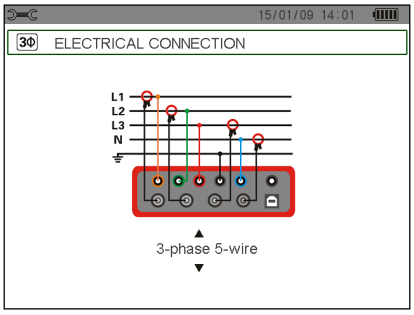


Figure 4-7: 3-phase 5-wire connection

4.3.5. Connection steps

★Power on the Analyzer.
★Configure the voltage ratio, select current sensor and the connection type of power grid.
★Connect the leads and current sensors to the unit.
★Connect the voltage test lead of ground lead and/or neutral lead to the ground lead and/or neutral lead of power grid, and connect the corresponding current sensor.
★Connect the L1 phase lead to the network L1 phase and connect the corresponding current sensor.
★If applicable, repeat the procedure for phases L2, L3.

Note: Please comply with the connection steps to reduce connection errors to a minimum and avoid wasting time.

4.4. Waveform Capture

Reminder: All screen interfaces can be saved (screenshot) by pressing the key. Refer to § 12 for related information).

When the device start up and connected to the power grid (connect with the voltage test line and current sensor), press key to waveform capture.

4.4.1. Display of the transients mode

Refer to §6.2.

4.4.2. Display of the inrush current mode

Refer to §6.3.

4.5. Display Harmonics

Reminder: All screen interfaces can be saved (screenshot) by pressing the key (refer to § 12).

When the device start up and connected to the power grid (connect well with the voltage test line and current sensor), press key to display harmonic.

4.5.1. Voltage harmonics display

Refer to §7.2.

4.5.2. Current harmonics display

Refer to §7.3.

4.6. Waveform Measurement

Reminder: All screen interfaces can be saved (screenshot) by press the key (refer to § 12).

When the device start up and connected to the power grid (connect well with the voltage test line and current sensor), press key to waveform measurement.

4.6.1. Display true RMS value

Refer to §8.2.

4.6.2. Display measurement value of total harmonic distortion
Refer to §8.3.
4.6.3. Display PEAK factor measurement
Refer to §8.4.
4.6.4. Display Min and Max RMS value, extreme value (voltage and current)
Refer to §8.5.
4.6.5. Simultaneous display all measurement parameter
Refer to §8.6.
4.6.6. Display vector diagram
Refer to §8.7.

4.7. Alarm Detection
Reminder: All screen interfaces can be saved (screenshot) by pressing the key (refer to § 12).
When the device start up and connected to the power grid (connect well with the voltage test line and current sensor), press key waveform measurement.
4.7.1. Parameter setting of alarm mode detection
Refer to §9.2. to set the alarm detection parameters and threshold value.
4.7.2. Alarm schedule setting
Refer to §9.3 to set the start and stop time.
4.7.3. Automatic stop
After reaching the stop date and time set by the operator, the alarm recording will be stopped automatically.
4.7.4. Manual stop
Refer to §9.3.3. If the preset stop date or time is not reached, the operator shall stop the detection manually.
4.7.5. Viewing the alarm log
Refer to §9.4.
4.7.6. Deleting the alarm log
Refer to §9.5.

4.8 Trend Chart Record Setting
Reminder: All screen interfaces can be saved (screenshot) by pressing the key (refer to § 12).
When the device is started up and connected to the power grid (connecting well with the voltage test line and current sensor), press key for waveform measurement.

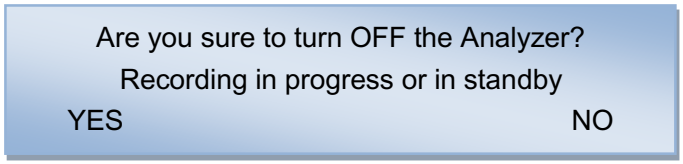
4.8.1. Trend chart monitoring parameters setting
Refer to § 10.3.
4.8.2 Trend chart schedule setting
Refer to § 10.2.

4.9. Energy Measurement
Reminder: All screen interfaces can be saved (screenshot) by pressing the key (refer to § 12).
When the device is started up and connected to the power grid (connect well with the voltage test line and current sensor), press W key for waveform measurement.
4.9.1. Power consumption measurement
Refer to §11.2.
4.9.2. Energy generated measurement
Refer to §11.6.

4.10. Data Communication With PC
The PC software can communicate with the Analyzer through the USB interface to upload and store the measured data, which can be easily reviewed for future reference.
Note: The record data in the Analyzer will not be deleted after they are transferred to the PC, but copied to the PC only, and the PC cannot read the Analyzer measurement data when the Analyzer is in any of the detection states of trend chart logging, transient capture, start current detection or alarm detection (waiting or in progress).

4.11. Delete Data
Before a new test, the memory can be freed up by deleting the stored data. Refer to §5.11.

4.12. Shut Down
Press the key to shut down the Analyzer.
If the Analyzer is in any of the detection states of trend chart recording, transient capture, start current detection, or alarm detection (pending or in progress), the Analyzer will not shut down without confirmation, and the following dialog box will pop up:



Select **Yes** or **No** by pressing the or key. Press key to confirm selecting red font.
★ If **No** is selected, recording will continue.
★ If **Yes** is selected, only the record at the time before the Analyzer is turned off will be saved, and the Analyzer is turned off after saving the records.

4.13. Power Supply
4.13.1. Recharge battery
Refer to §3.6.3.
4.13.2. Power supply operation
Refer to §3.6.5.

5. SETTING

Press key to enter the main setting menu. Before using the Analyzer, please set up the Analyzer and confirm the parameters. In addition, the settings can be modified if necessary. The Analyzer setting information is saved in the Analyzer after shutdown.

5.1. Setting Select Menus
Press key to select the sub-menu, press key to confirm, and press key to return to the main screen.

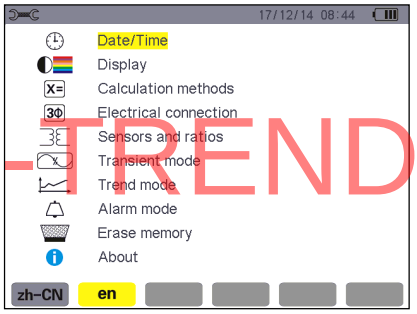


Figure 5-1: Sub-menu display interface

Name	Sub-menu	Refer
Date/Time	Date and time setting.	§5.3
Contrast/ brightness	Screen contrast and brightness setting.	§5.4.1
	Voltage curve and current curve color setting	§5.4.2
Calculation Method	Reactive parameters calculation selection (with or without harmonics).	§5.5
Electric Wiring	Select the type of electric connection to the power grid (attention: calculations depend upon the type of connection type).	§5.6
Sensor & Ratio	Select the current sensors (008B current clamp, 040B current clamp, 068B current clamp, flexible current clamp).	§5.7.1
	Voltage ratio setting	§5.7.2
Transient Mode	Current threshold setting	§5.8.1
	Voltage threshold setting	§5.8.2
Trend Mode	Setting the request monitoring parameters of the trend record	§5.9
Alarm Mode	Setting the request parameters, threshold of the alarm	§5.10
Delete Data	Delete some or all user data.	§5.11
About	Serial number, software and hardware version numbers, and capacity of on-board memory card.	§5.12

5.2. Display Language

To select the display language, press the yellow key under the corresponding icon on the screen (Figure 5-1). Select **zh-CN** for Chinese; and select **en** for English. Yellow background icon indicates the current language.

5.3. Date/Time

This menu defines the system date and time. The display is as follows:

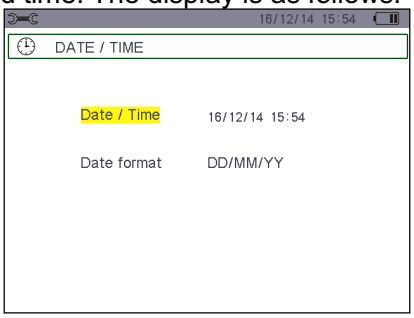


Figure 5-2: Date/Time menu

The Date/Time area is highlighted in yellow.

- Press key to change the date/time setting. The arrows ▲▼indicate the present value can be changed, press or key to increase or reduce the value.
  Press or key to select the require change value, press key to confirm.
- Change the date setting. Press or key select the date/time item and display as yellow highlighted, and press key to confirm. The arrows ▲▼ indicate the present value can be changed.
  Press or key to select DD/MM/YY or MM/DD/YY or YY/MM/DD, press key to confirm.
- Press key to return to the setting main menu.

5.4. Display

5.4.1. Contrast/Brightness setting

Set the display contrast and brightness, as shown in the Figure below:

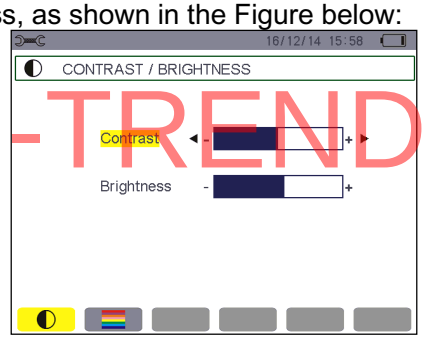


Figure 5-3: Contrast/Brightness menu

The selected field is highlighted in yellow.

- Press or key to modify the contrast
- Press or key move to the next item.
- Press or key to change the brightness.
- Pess key return to the main menu.

5.4.2. Color setting

The menu will display the colors of the voltage and current curves. The colors available are: yellow, orange, red, pink, brown, green, dark green, light blue, sky blue, dark blue, light grey, grey.

The display screen is shown as follows:

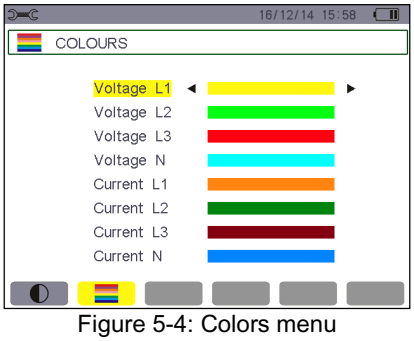


Figure 5-4: Colors menu

The selected field will be highlighted in yellow.

- Press or key to select the color of the voltage and current curves
- Press or key move to next item.
- Press key return to the main menu.

5.5. Calculation Methods

X= Menu sets the calculation of reactive parameters (power and energy) with harmonics or not.

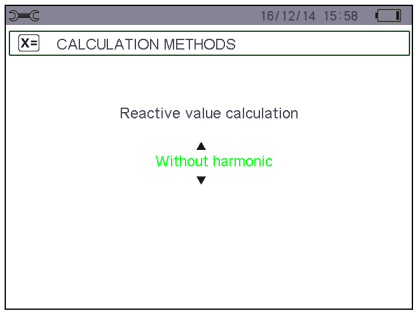


Figure 5-5: Calculation methods menu

- Press ▲ or ▼ key to select the harmonic or not.
  ★With harmonics: Including harmonic when calculating reactive quantities.
  ★Without harmonics: Excluding harmonic when calculating reactive quantities.
- Press ↩ key to return to the main menu.

5.6. Electrical Wiring Selection

The 3Φ menu is used to select the correct electrical wiring mode, as shown in figure5-6:

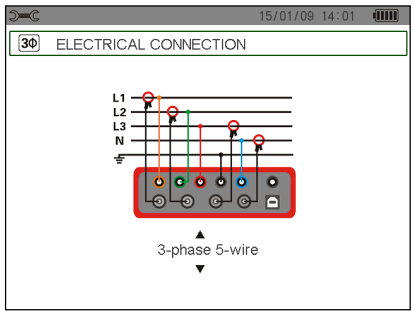


Figure 5-6: The Connection menu

Several electrical diagrams can be selected as follow:

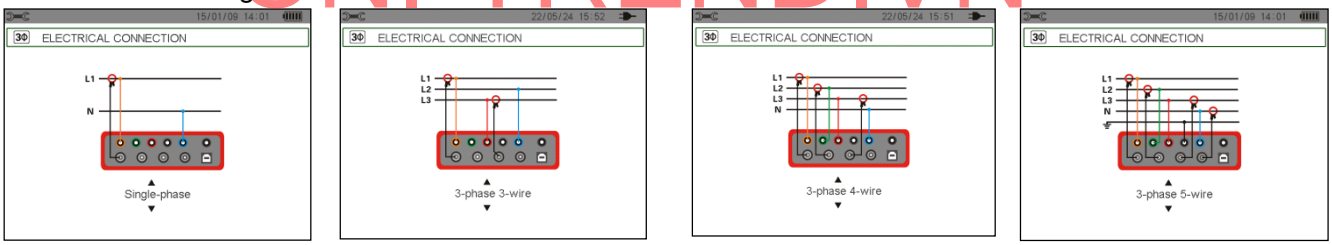


Figure 5-7: Four type can be selected

Set up the wiring as the following steps:

- Pressing ▲ or ▼ key to select Single-Phase, 2-Phase, 3-phse 3-wire or 3-phase 4-wire or 3-phase 5-wire connection.
- Press ↩ key to return to the main menu.

5.7. Sensors & Ratio Selection

5.7.1. Current sensors

In menu, press and select yellow key **A** icon to choose the current clamp sensors and ratios. The device can select 4 types of current clamp sensors, and also can choose optional current clamp sensor, and set the turns ratio according to requirements.

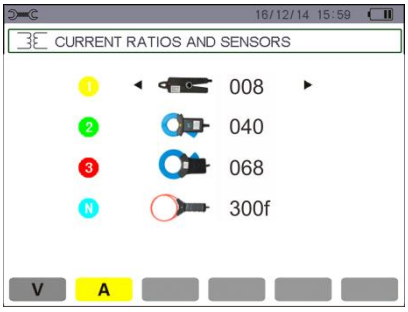


Figure 5-8: Current clamp and ratios screen in the Sensors and ratios menu

Optional current sensors:

	008B current clamp: 10mA~ 10A
	040B current clamp: 0.10A~ 100A
	068B current clamp: 1.0A~ 1000A
	300F Flexible Current Sensor (with Integrator) : 10A ~ 6000A

300F flexible current sensor, integrator mounted in handle, 2-in-1 mode:

- 4 pcs of 300F flexible current sensors corresponds to L1,L2,L3,N:

Insert the 300F audio plug into the current clamp input port of the power quality Analyzer.

- Toggle the switch to the right to turn on the power of the flexible current sensor, the "POWER" indicator will be on, then toggle the switch to the left to turn off the power of the flexible current sensor.

Note: The power of the flexible current sensor is supplied by the 6F22 9V dry battery. The lit “BAT LOW” indicator light on the right side indicates that the battery voltage is low and please replace the battery.

5.7.2. Voltage ratio

In menu, press and select the yellow **V** icon to set the voltage ratios.

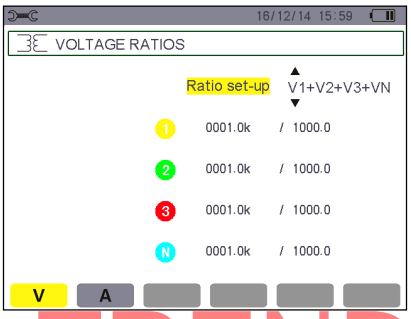


Figure 5-9: Voltage ratios setting menu

The ratios of all channels can be set as the following:

- (4V, 1/1) The ratios of 4 channels are 1:1.
- (4V) The ratio of 4 channels are same.
- (3V+VN)L1\L2\L3 is the same ratio. The ratio of N line is set independently.
- (V1+V2+V3+VN) The ratios of 4 channels are set respectively.

★Press key and then the▲or▼ arrow keys appear in the ratio setting. Press ▲or▼ key to select 4 types of ratio combinations, then press key again to confirm.

★Press ▲or▼key to select the corresponding ratio value, which will be highlighted in yellow.

★ Press key to enter ratio setting mode, and then the arrow keys▲▼ appear.

★Press ◄or►key to select the position which is to be changed, press ▲or▼key to increase or decrease the value, then press key to confirm.

★Press key to return to setting main menu.

5.8. Transient Capture Setting

In the menu, the captured transient current and the trigger threshold of captured voltage can be set.

5.8.1. Current thresholds

In interface, press the yellow **A** icon to select the current thresholds of transient capture.

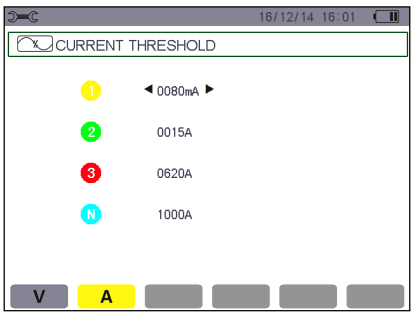


Figure 5-10: Current thresholds setting menu

★The arrow◄ ► indicates the channel of cursor.

★Press ▲or▼key to select the channel, then press key (with ▲▼ arrow key displayed) to start modification.

★Press or to select the change position and threshold current unit (mA/A), then press or key to increase or decrease the value.
★Press key to confirm.

5.8.2. Voltage thresholds

In interface, press the **V** icon to select the voltage thresholds of transient capture.
All the voltage threshold can be set with the three combined modes below:

- (4V)—The thresholds of 4 channels are same.
- (3V+VN) –The threshold of L1\L2\L3 are same. The threshold of N line is set independently.
- (V1+V2+V3+VN)—The thresholds of 4 channels are set respectively.

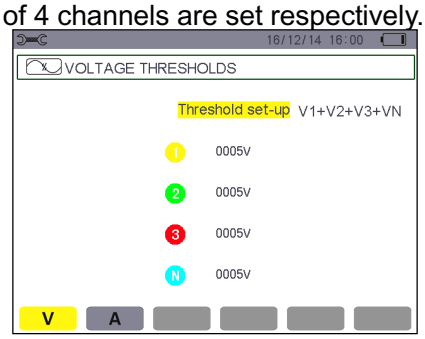


Figure 5-11: Voltage thresholds setting menu

★Press key and then the arrows▲▼key appears in the ratio setting. Press or to select the above 3 different threshold combination modes, then press to confirm.
★Press or key to select the corresponding require thresholds, which will be highlighted in yellow.
★Press key to enter into threshold setting (with the arrows▲▼ displayed), then start to modify.
★Press or to select the required change position and threshold unit (V/kV), press or key to increase or decrease the value.
★Press key to return to the main menu.

5.9. Trend Monitoring Parameter Setting

The Analyzer has a trend chart recording function (refer to § 10), which records the measured or calculated values (e.g. Urms, Vrms, Arms, etc.). The menu is used to set the parameters to be monitored in the trend graph recording.
Press the corresponding function icon , , , to select the required monitoring parameters groups. The selected parameters groups are identified by the icon with a yellow background.
The configuration example is shown in the Figure below:

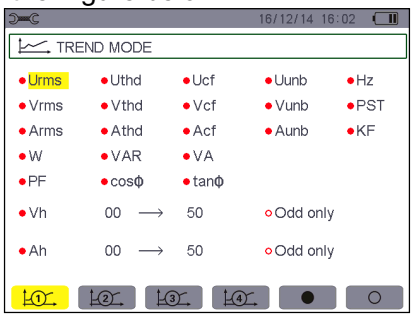


Figure 5-12: Trends chart record parameter selection

★Press the icon function key to set the monitoring parameters group 1. The selected icon is displayed with yellow background.
★Press or and or key to move the cursor.
★Press to select/cancel. Red solid dot indicates selected, and red hollow dot indicates unselected.

Optional monitoring parameters are available:

Unit	Description
Urms	True RMS phase-to-phase voltage.
Uthd	Harmonic distortion of the phase-to-phase voltage (2 , 3).
Ucf	Crest (peak) factor of phase-to-phase voltage (2 , 3).
Uunb	Phase-to- phase voltage unbalance (2 , 3).
Hz	Network frequency.
Vrms	True RMS phase-to- neutral voltage.
Vthd	Total harmonic distortion of the phase-to-neutral voltage.
Vcf	Crest factor of phase-to-neutral voltage.
Vunb	Phase-to-neutral voltage unbalance (2 , 3).

PST	Short-term flicker.
Arms	True RMS current.
Athd	Total harmonic distortion of the current.
Acf	Crest factor of current.
Aunb	Current unbalance (2 , 3).
KF	K factor.
W	Active power.
VAR	Reactive power.
VA	Apparent power.
PF	Power factor.
DPF	Displacement power factor.
Tan	Tangent.
?	See comment below (relate to the harmonic).

The last two lines need special settings, shown as follows:

Figure 5-13: These two lines involve harmonics

These two lines relate to the monitoring values of harmonics VAH, Ah, Vh and Uh. The user can independently select the measured harmonic order (0 to 50th) to record the harmonic ratio of corresponding order, and can also choose to record the odd harmonics only. Specific operations are as follows:

- **Select the monitoring harmonic parameters**: the selected ? highlighted display in yellow, press key and appear the arrows key▲▼, press or key to select the require parameters (VAh, Ah, Vh, and Uh), "?" indicate is unselected. Press key to confirm, the selected values field is highlighted in yellow.
- Press to go to the next option.
- **Select the starting harmonic order**: the relate option highlighted in yellow. Press key and appear the arrows▲▼ key. Press or key to increase or decrease the starting harmonic order, then pressing key to confirm. Press key to go to the next option.
- **Select the finishing harmonic order**: (the finishing harmonic order must be higher than or equal to the starting harmonic order) highlighted in yellow. Pres key and appear arrows▲▼ key. Press or key to increase or decrease the finishing harmonic order, then press key to confirm.
- Press to go to the next option.
- **Record odd harmonics only**: press key to select or cancel to record the odd harmonic only, the solid red dot means selected:
  Selected: Record only the odd harmonic of the two harmonic order.
  Not selected: Record all harmonic order (include the odd harmonic).

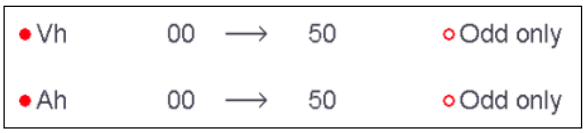


Figure 5-14: Record harmonic order setting

- Press key to return to setting main menu.

Set up another group of trend chart recording & monitoring parameter settings in the same way.

5.10. Alarm Monitoring Parameter Setting

The menu is used to set the parameters and thresholds to be monitored in alarm mode (refer to § 9). User can set 40 groups of alarm monitoring parameters.

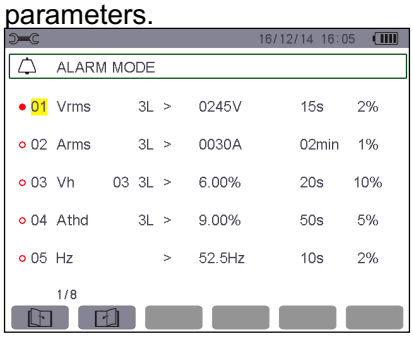


Figure 5-15: Alarm mode menu

■ Use the ▲ or ▼ key to select different setting alarm parameter groups.
■ Press ↵ key to select present position parameter and then arrows ▲▼ key appear.
■ Press ▲ or ▼ key to select the setting parameters (Vah, Ah, Uh, etc., refer table in § 5.9), then press ↵ key to confirm. The selected parameter is highlighted in yellow.
■ Press ◄ or ► keys to horizontally select each parameter, then press ↵ key to confirm (with the arrows ▲▼ key displayed. Press ▲ or ▼ key to select the required setting value, then press ↵ key to confirm.

Set the other values of each parameter in the same way.

Define each alarms (optional):

★The alarm types (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) (refer the abbreviations in § 3.9).
★The harmonic order range (between 0 and 50, for Vah, Ah, Uh and Vh value).
★The alarm trigger channel (3L: 3-phases, L1, L2, L3 can be triggered individually; N: neutral can be triggered).
★The alarm judgement direction (> or < can be selected for Arms, Urms, Vrms, Hz only; otherwise only one direction).
★The alarm triggering threshold (The threshold unit of W, VAR, VA, Arms, Urms, and Vrms can be set).
★Exceed threshold trigger min. time (can set 0s - 99 minutes).
★The alarm hystersis value (The percentage increases or decreases from the corresponding alarm threshold, optional values can be selected with 1%, 2%, 5% or 10%. If the selected percentage is exceeded, the alarm will be stopped. Please refer §17.2).

■ Press ↵ key to select or cancel the alarm parameter groups. Red solid dot indicates selected, and red hollow dot indicates unselected.
■ Press or icons of the yellow background function key to display the alarm monitoring parameter groups of next page or previous page.
■ Press ↩ key to return to setting main menu.

5.11. Delete Data

The menu is used to delete partial or all of the data stored in the Analyzer (trend chart record, transient record, starting current, alarm, screenshot, Analyzer setting, monitoring parameter setting, etc.).

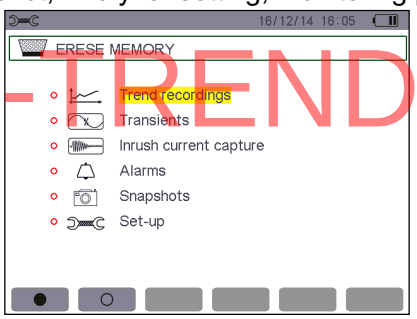


Figure 5-16: Delete data menu

■ **Partial deletion:**

★Press ▲ or ▼ key to select the option to be deleted. The selected option will be highlighted in yellow.
★Press ↵ to select/unselect. Red solid dot indicates selected, and red hollow dot indicate unselected.

Note: If the setting parameter is selected for deletion, the Analyzer screen will display message “After the configuration is deleted, the device will be turned off”.

★Press icon function key, then the icon will be highlighted in yellow background and to indicate the “ready-to-delete” state. Press the icon again to cancel the delete state.
★In the state of ready to delete, press ↵ key to confirm deleting the selected parameters.
★Press ↩ key to return to setting main menu.

■ **Delete all:**

★Press ● icon function key to select all the stored data (Red solid dot indicates selected), then the screen will display the message “After the configuration is deleted, the device will be turned off”.

Note: Once the set parameter is selected for deletion, the message “After the configuration is deleted, the device will be turned off” will be displayed on the screen.

★ Press ○ icon function key to cancel all the selection, red hollow dot indicate is unselected.
★Press ↩ key return to setting main menu.

5.12. About

The screen will display the serial number of the device, firmware version, DSP software version, icon version, and SD card capacity.

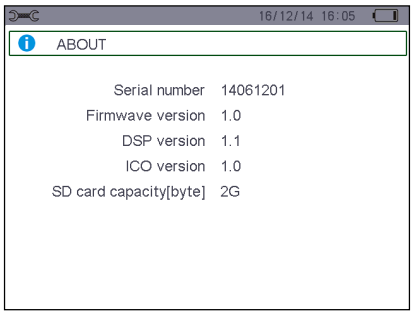


Figure 5-17: About menu

Press key to return to the main setting menu.

6. WAVEFORM CAPTURE MODE

6.1. Sub-Mode Selection

The waveform capture sub-modes are listed in the screen below, and the following section will be introduced individually.

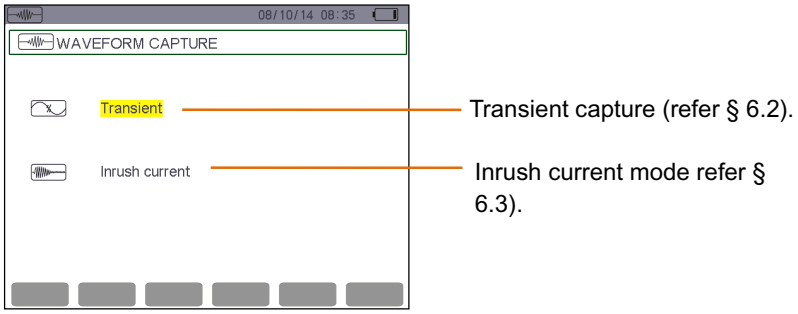


Figure 6-1: Waveform capture mode

Enter the sub-modes as the following steps:

★ Press or key to select, the selected mode will be highlighted in yellow.

★ Press key to confirm.

★Press key to return to waveform capture main menu.

6.2. Transient Measurement Mode

Transient measurement mode can be used to detect transient event records, browse transient records, and select the deletion of transient records. 150 groups of transient measurement records can be saved.

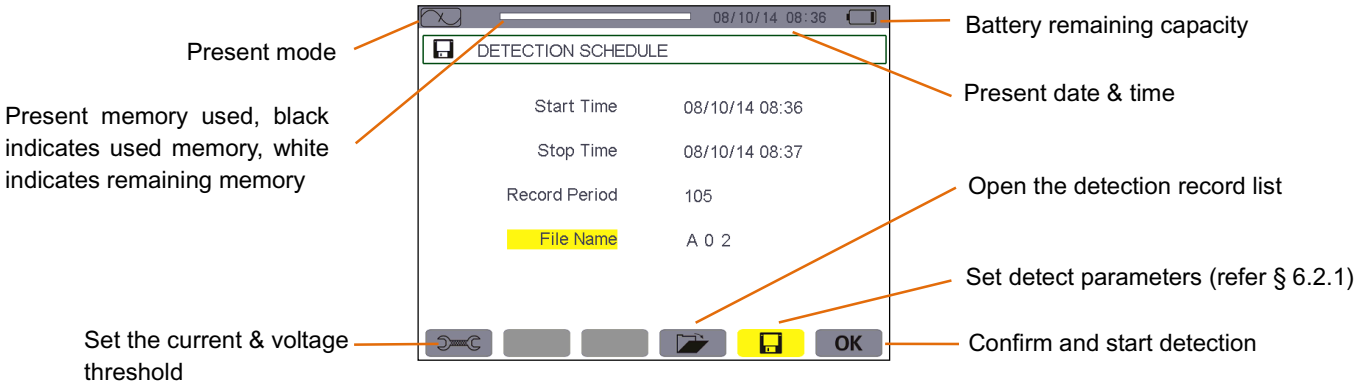


Figure 6-2: Detection schedule in transient detection mode

6.2.1. Setting & starting detection

Press icon function key, and then the detection schedule is displayed.

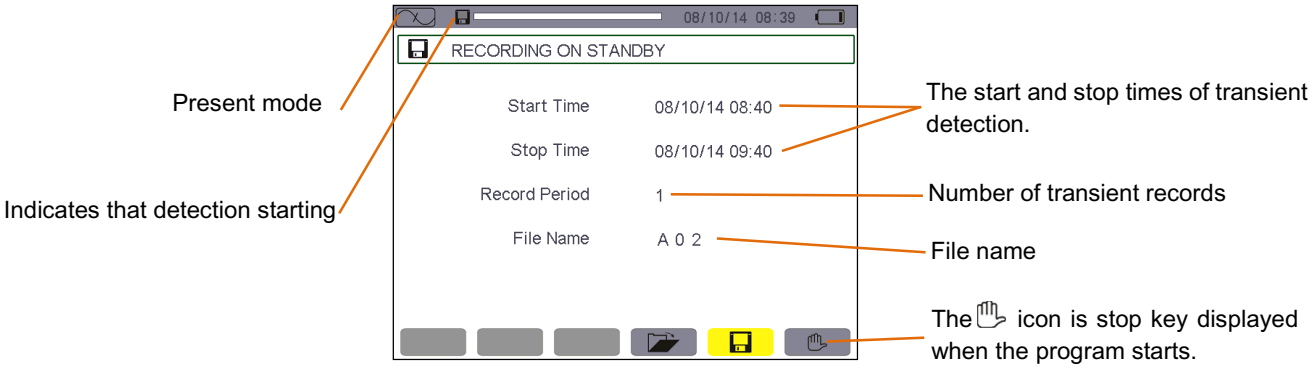


Figure 6-3: The analyzer are performing transient schedule

6.2.1.1. Step 1: Parameters setting

★Press or key to select the start time (the selected field is highlighted in yellow). Press key to enter the value setting mode, and the arrows▲▼key appears at the start date & time optional item value.

★Press or to increase or decrease the value, and press or key move to next item.

Note: The start time must be later than the present time.

★Press key to confirm the start date and time of detection.

★Press or key to select the stop time(the selected field is highlighted in yellow), press key to enter into setting values, then the arrows▲▼key appears at the stop date & time optional item value.

★Press or to increase or decrease the value, press or key move to next item.

Note: The stop date and time must be later than the start date and time.

★Press key to confirm the stop date and time.

★Setting the number of records in the same way. The total number of transient records that saved by the Analyzer is 150 groups maximum.

★Set the file name in the same way. The file name can be composed of numbers 0-9 and letters A-Z, the length of the file name is 8 characters at most.

★Press icon function key to enter into the interface of setting **voltage** and **current threshold**. After the setting is completed, press key to return to the waveform capture mode directly.

6.2.1.2. Step2: Start detection

Press **OK** icon function key to start detection at the preset start and stop times.

★The **OK** icon disappears and the icon appears instead.

★Before the real time reaches the preset start time, "**Detection on standby**" will be displayed, and the icon will flashes on the top display bar.

★When the real time reaches the preset start time, "**Detection in progress**" will be displayed.

★After the real time reaches the preset stop time and the detection is completed, the detection schedule and the **OK** icon (bottom right-hand corner of the screen) will be displayed again. At this time, the next detection schedule can be set.

Note: The transient capture is related to voltage and/or current and is consistent with the setting trigger threshold. If triggered by an event, the Analyzer will save the current waveform and voltage waveform.

Press key to return to the main menu of waveform capture.

6.2.1.3. Stop detection

Before the real time reaches the preset stop time, the user can press the corresponding yellow function key to stop the transient detection, and the **OK** icon will appear again at this time.

6.2.2. Display transient measurement record

The saved transient detection records are displayed by following the steps below:

★Press icon function key to display the transient detection record list, shown as follow:

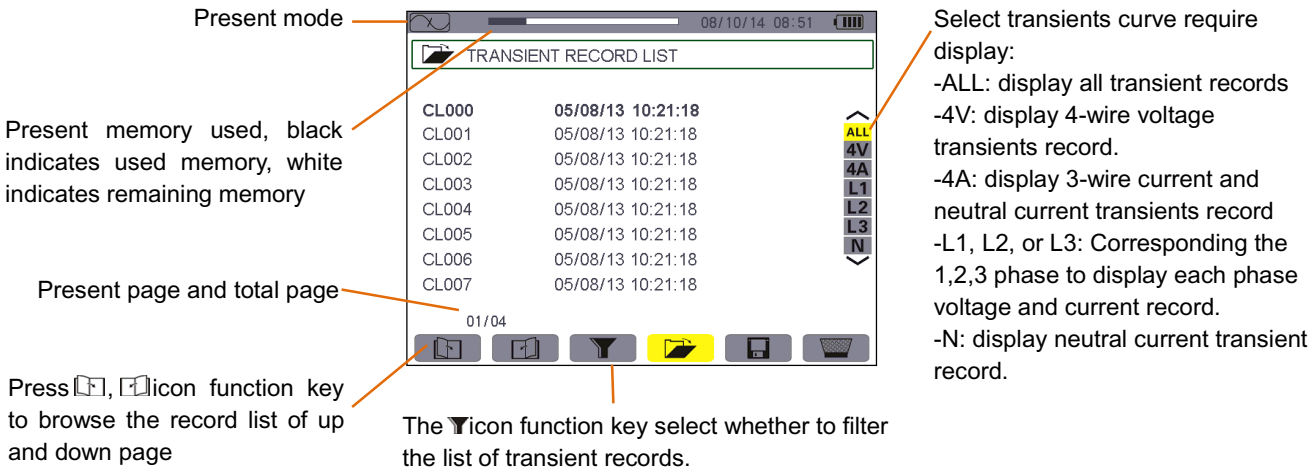


Figure 6-4: Transient list screen

★Press or key to select the desired transient detection record. The selected line will be displayed in bold font. Then press key to confirm. The related transient detection record will be displayed as curves.

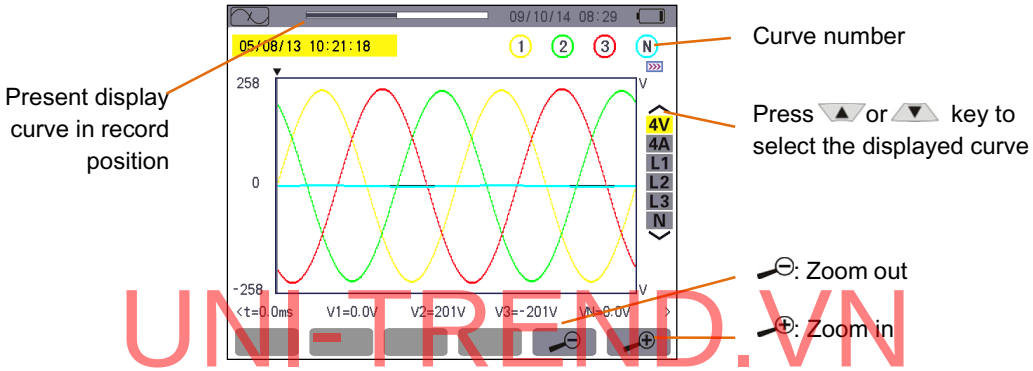


Figure 6-5: Transient waveform curves

★Press or key to select the desired curve, press or key to move the cursor leftwards and rightwards, or long press to move the cursor quickly.

★Press key to return to the transient detection record list.

6.2.3. Delete transient measurement record

The delete icon will be displayed only when displaying transient record list. The deletion steps are as follows:

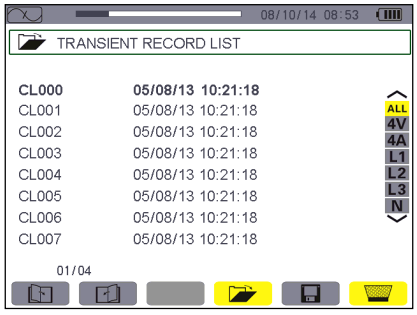


Figure 6-6: Delete transient measurement record

★Press or key to select the transient record to be deleted. The selected record will be displayed in black bold font.

★Press con function key to prepare deletion. The con displayed in yell background indicates selected and ready to delete. Press icon function key or key to cancel the delete state.

★In the state of ready to delete, press key to confirm deleting the record.

6.3. Inrush Current Mode

In inrush current mode, the Analyzer can monitor the current waveform and voltage waveform when the electrical equipment starts up, and there are two submenus of **RMS** and **PEAK** in the capture record (refer to 6.3.2).

The Analyzer can store only one group of inrush current waveform capture chart.

6.3.1. Capture Schedule

Inrush current capture schedule is as follows:

Press key to enter into the corresponding menu and display the capture schedule interface.

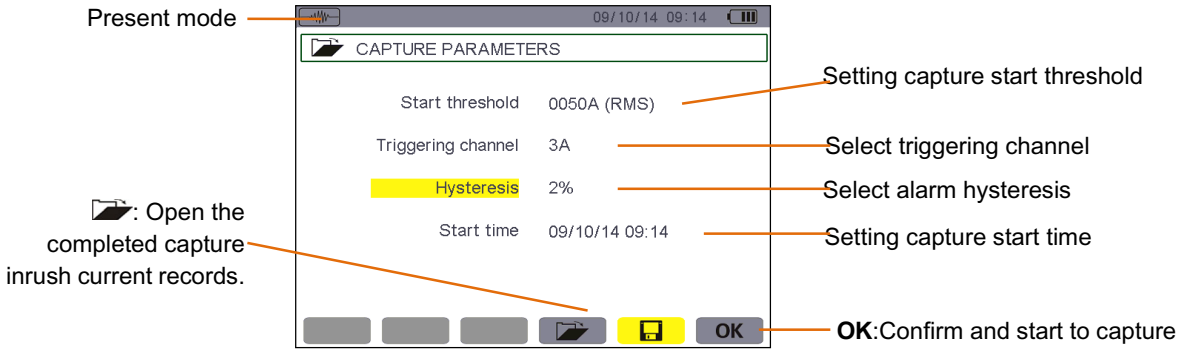


Figure 6-7: Setting the capture schedule of inrush current

6.3.1.1. Step 1: Parameter setting

Specific operations are as follows:

★Press or key to select the start threshold setting (the selected item will be highlighted in yellow), Press key to enter and set relate values, then the arrows▲▼ key appears on various start threshold value.

★Press or to increase or decrease the value and press or to move to the next item and setting.

★Press key to confirm.

Operate in the same way to set the **triggering channel**, **Hysteresis** and **Start time**.

Note: For more information about the hysteresis, please refer to § 17.2.

6.3.1.2. Step 2: Start capture

Press **OK** icon function key to start capture with the pre-set date and time.

★The **OK** icon disappears and the icon appears instead.

★Before reaching the preset start time, the screen will display "**capture pending**" and the icon flashes in the screen's upper display bar.

★After reaching the preset start time and meeting the activation condition, the screen will display **"Capture in progress"**, and the memory occupation indicator bar will be displayed at the top of the screen. (The black bar is the memory used; the white bar is the memory available), the memory card occupancy indicator bar is only displayed during the capture process and disappears after the capture is completed.

★If the stop conditions are met (refer to 17.5) or if the memory of the Analyzer is full, the capture will stop automatically and the "**Capture Schedule**" and **OK** icons will appear again.

Note: The Analyzer can only store one group of inrush current capture waveform, the user needs to delete the previous capture before the next capture can be made.

Press key to return to the waveform capture menu.

6.3.1.3. User stops waveform capture

User presses icon (bottom right corner of the screen) function key to stop waveform capturing, and the **OK** icon will appear in the same place.

6.3.2. Inrush Current Capture Parameter Display

Display the record parameters of inrush current capture by following the steps below:

- Press icon function key to open the completed inrush current record, shown as follow:

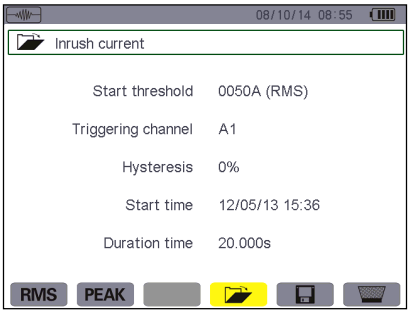


Figure 6-8: Capture parameters interface

No.	Function	Refer
(1)	**RMS** mode	§ 6.3.3
(2)	**PEAK** mode	§ 6.3.4

■ Press the RMS or PEAK icon function key to select the capture parameter to be displayed in **RMS** mode or **PEAK** mode. The Analyzer displays the corresponding current waveform and voltage, and the user can move the cursor along the waveform curve to zoom in or zoom out to observe the waveform. Related Information:

★ The cursor pointing on the curve are instantaneous current or voltage values.
★ The maximum instantaneous current (whole inrush cycle).
★ Half-cycle current **RMS** value of the cursor mark point.
★ The maximum half-cycle RMS current (whole inrush cycle).
★ Maximum instantaneous value in inrush cycle (PEAK).
★ The starting time and the motor starting period.

Caution: Voltage must be available before the motor can be started at a stable and correctly servo-controlled frequency.

6.3.3. True RMS Current

In RMS mode, the Analyzer displays the half-cycle true RMS trend curve chart of the start-up process.

6.3.3.1. Displaying 3A in RMS mode

The related information are as follow:

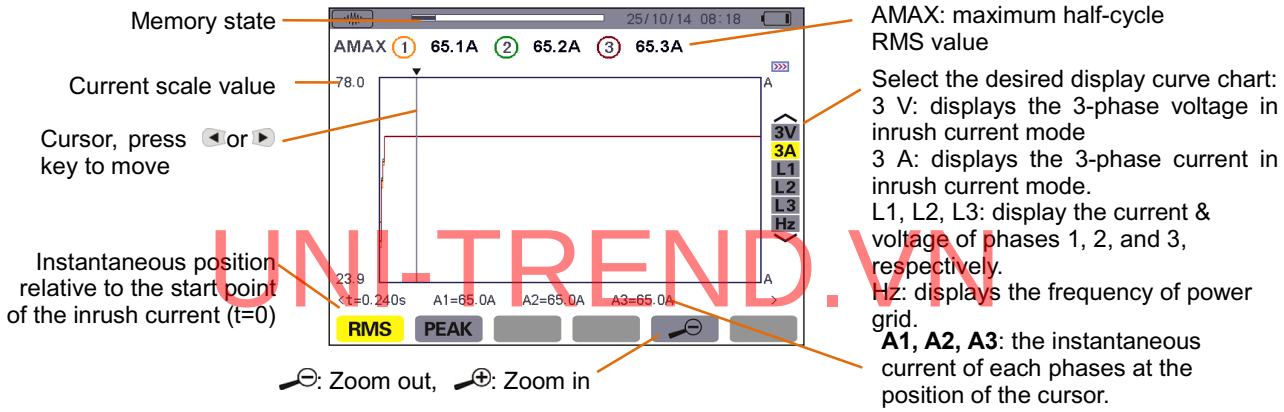


Figure 6-9: Displaying 3A in RMS mode

6.3.3.2. Displaying L1 in RMS mode

The related information are as follows:

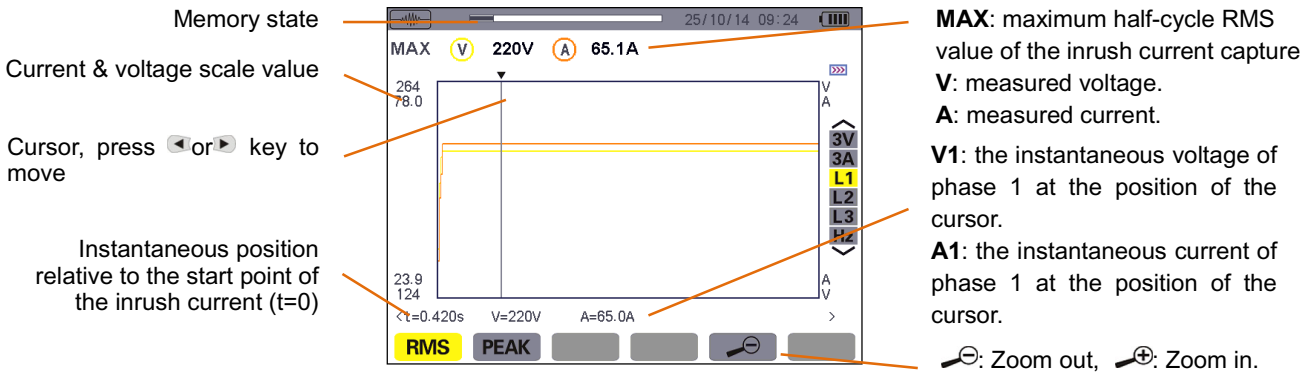


Figure 6-10: Displaying L1 in RMS mode

Note: L2 and L3 can display the true RMS trend curves of phase 2 and phase 3 half-cycle current and voltage starting process, same as L1 display screen.

6.3.4. Instantaneous Value of Inrush Current in PEAK in mode

Displaying the envelope curve and the captured waveform of inrush current in PEAK mode.

6.3.4.1. Displaying 4A in PEAK mode

The related information are as follows:

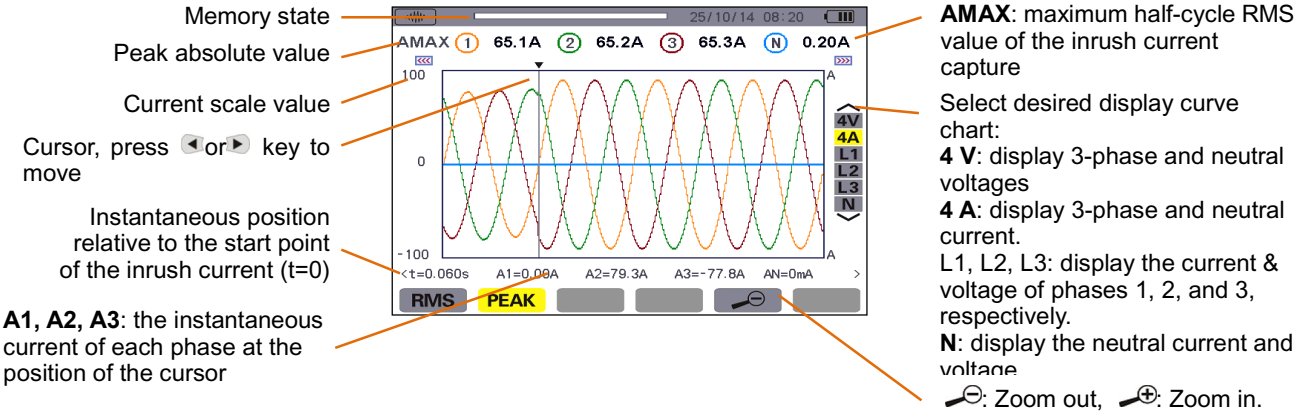


Figure 6-11: Displaying 4A in PEAK mode

6.3.4.2. Displaying A1 PEAK
The related information are as follows:

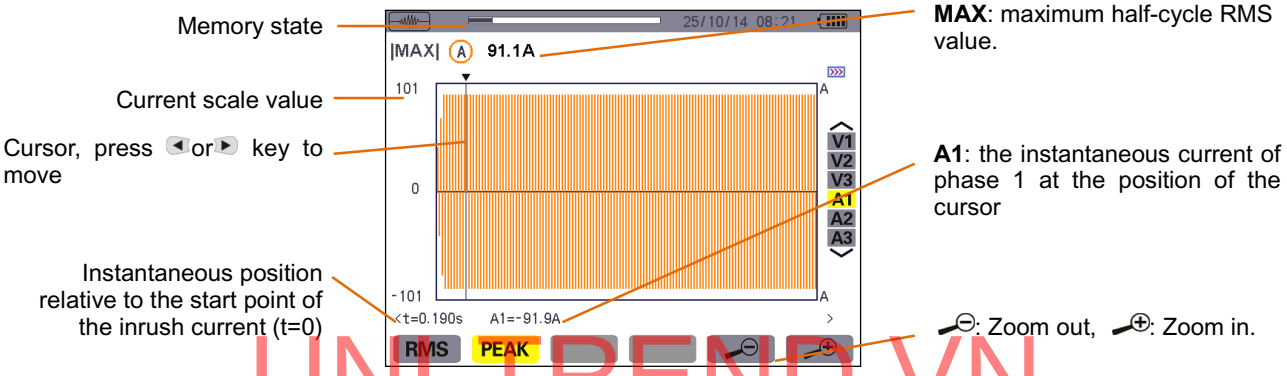


Figure 6-12: Displaying A1 PEAK

Note: A2 and A3 can display the current envelope curve record of phase 2 and phase 3, the above is the display screen of A1. V1, V2, V3 display the voltage envelope curve chart of phase 1, phase 2, and phase 3, similar to the display screen of A1.

7. HARMONICS MODE

In harmonic mode, the Analyzer can display each harmonic ratio of voltage, current and apparent power, measure harmonic currents generated by nonlinear loads, and analyze the problems caused by harmonics (heating case of neutral wires, conductors and motors, etc.).

7.1. Select Sub-Menu

The harmonic mode submenus are listed in the following screens and will be introduced separately in the following sections.
Select the measurement type with the following function keys at the bottom of the screen.

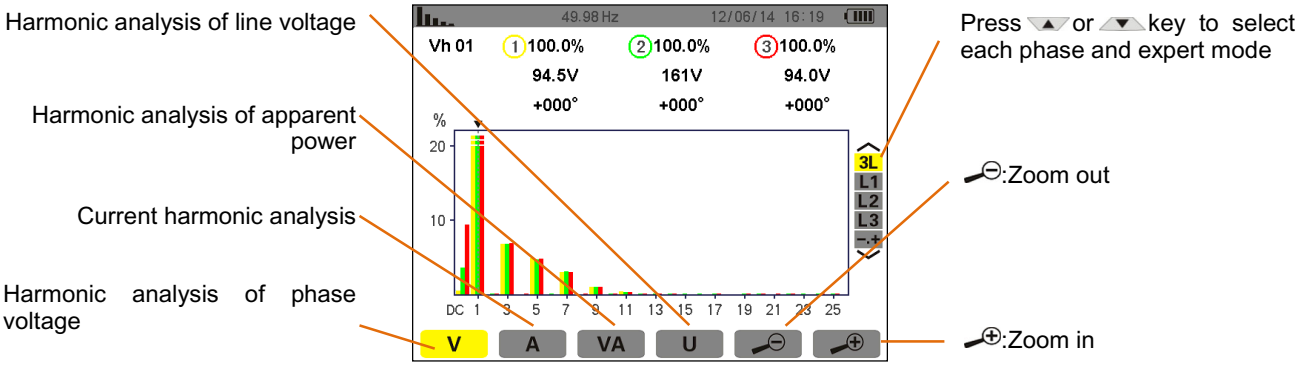


Figure 7-1: Harmonic mode screen

7.2. Phase Voltage V

This sub-menu displays the phase voltage harmonic.

Note: The display curve is determined by the wiring type (refer to §5.6):

★Single-phase: no choice (L1 only).

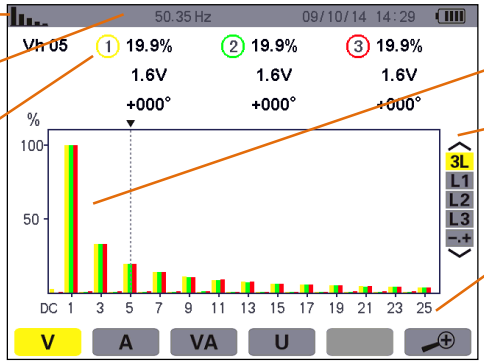
★2-phase: 2L, L1, L2.

★3-phase 4wire or 5-wire: 3L, L1, L2, L3, -,+ (expert mode).

The 3-phase wiring is shown in the Figure, which is also valid for the other submenus.

7.2.1. Displaying 3L phase-voltage harmonic

The information are shown as below:



Present mode

Instantaneous frequency

The cursor corresponding harmonic order parameters.
Vh05: harmonic order
%: Harmonic ratio relative to fundamental wave.
V: The harmonic RMS voltage
+000°: Phase shift relative to the fundamental wave

Harmonic order selection. Press ◄ or ► keys to move the cursor

Press ▲ or ▼ key to display each phase and expert mode

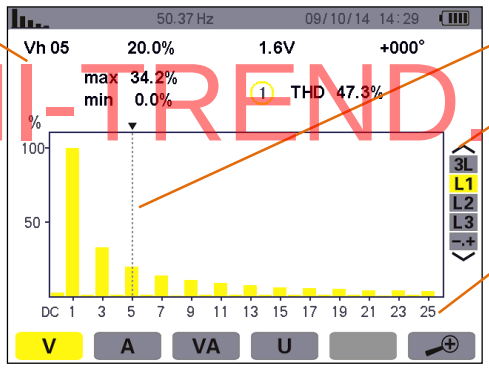
Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
DC: DC component
1~25: harmonic order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-2: Displaying 3L phasevoltage harmonic

Expert mode displayed in 3 x 3L or L1, L2 and L3 (*) (3-phase wiring only - refer to §7.6)

7.2.2. Displaying L1 phase-voltage harmonic

The information are shown as below:



The cursor corresponding harmonic order parameters.
Vh05: harmonic order
%: Harmonic ratio relative to fundamental wave.
V: The harmonic RMS voltage
+000°: Phase shift relative to the fundamental wave
Max, min: harmonic ratio of maximum and minimum (press ⌫ key to reset).
THD: total harmonic distortion.

Harmonic order selection, Press ◄ or ► keys to move the cursor

Press ▲ or ▼ key to display each phase and expert mode

Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
DC: DC component
1~25: harmonics order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-3: Displaying L1 phase-voltage harmonic

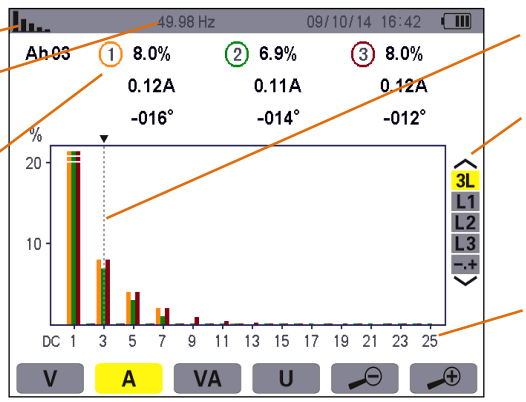
Note: L2 and L3 display the phase voltage harmonics of phase 2 and phase 3 respectively, same as the L1 screen display.

7.3. Current A

The sub-menu displays the current harmonics.

7.3.1. Displaying 3L current harmonic

The information are shown as below:



Present mode

Instantaneous frequency

The cursor corresponding harmonic order parameters
Ah03: harmonic order
%:Harmonic ratio relative to fundamental wave
A: Harmonic RMS current
+000°: Phase shift relative to the fundamental wave

Harmonic order selection, Press ◄ or ► keys to move the cursor

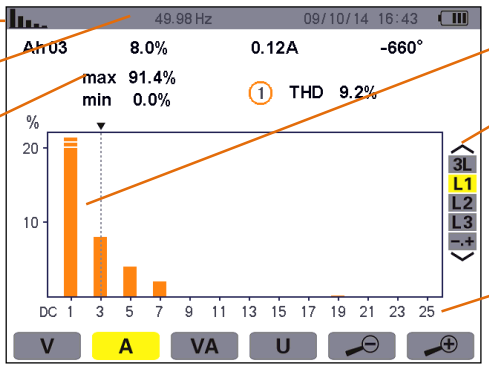
Press ▲ or ▼ key to display each phase and expert mode

Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
1~25: harmonics order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-4: Displaying 3L current harmonic

7.3.2. Displaying L1 current harmonic

The information are shown as below:



Present mode

Instantaneous frequency

The cursor corresponding harmonic order parameters
Ah03: harmonic order
%:Harmonic ratio relative to fundamental wave
A: Harmonic RMS current
+000°: Phase shift relative to the fundamental wave

Harmonic order selection, Press ◄or► keys to move the cursor

Press ▲or▼key to display each phase and expert mode

Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
1~25: harmonics order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-5: Displaying L1 current harmonic

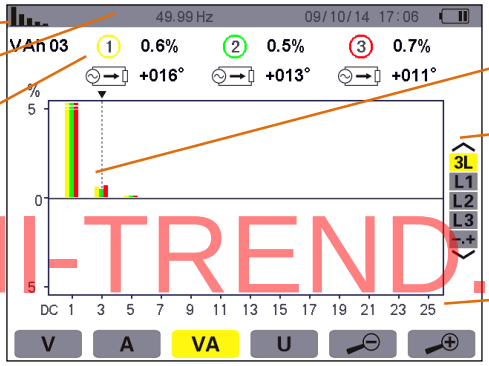
Note: L2 and L3 display the current harmonics of phase 2 and phase 3 respectively, same as the L1 screen display.

7.4. Apparent Power VA

The sub-menu displays apparent power harmonic.

7.4.1. Displaying 3L apparent power harmonic

The information are shown as below:



Present mode

Instantaneous frequency

The cursor corresponding harmonic order parameters
VAh03: harmonic order
%:Harmonic ratio relative to fundamental wave
+000°: Phase shift relative to the fundamental wave
: indicates that the harmonic generates electrical energy
:Indicates that the harmonic consumes electrical energy

Harmonic order selection, Press ◄or► keys to move the cursor

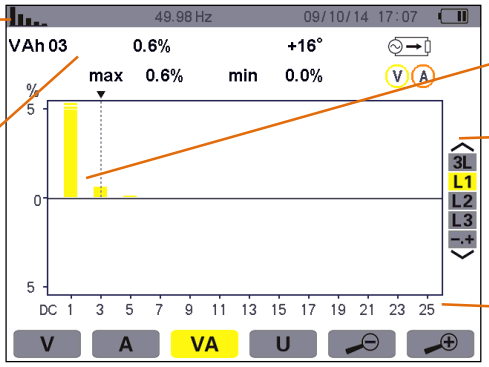
Press ▲or▼key to display each phase and expert mode

Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
1~25: harmonics order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-6: Displaying 3L apparent power harmonic

7.4.2. Displaying L1 apparent power harmonic

The information are shown as below:



Present mode

The cursor corresponding harmonic order parameters
VAh03: harmonic order
%:Harmonic ratio relative to fundamental wave
+000°: Phase shift relative to the fundamental wave
: indicates that the harmonic generates electrical energy
:Indicates that the harmonic consumes electrical energy.
Max,min:harmonic ratio of maximum and minimum, press key to reset

Harmonic order selection, Press ◄or► keys to move the cursor

Press ▲or▼key to display each phase and expert mode

Horizontal lines indicate the harmonics order (odd order)
Harmonic ratio relative to the fundamental is shown as a percentage (fundamental: 1st harmonic)
1~25: harmonics order.
Automatically displays 26th to 50th order when the cursor exceeds 25th order

Figure 7-7: Displaying L1 Apparent power harmonic L1

Note: L2 and L3 display the apparent power harmonics of phase 2 and phase 3 respectively, same as the L1 screen display.

7.5. Line Voltage U

The corresponding submenu displays the line voltage harmonic and there are 2-phase and 3-phase wirings only.

7.5.1. Displaying 3L line voltage harmonic

The information are shown as below:

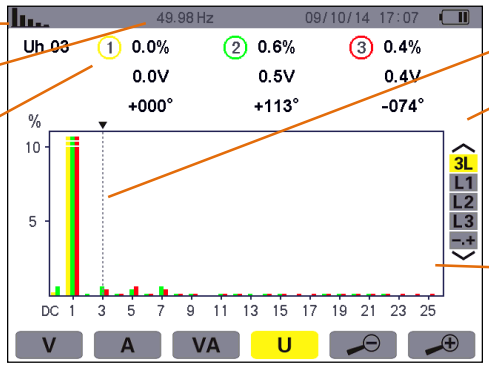


Figure 7-8: Displaying 3L line voltage harmonic

7.5.2. Line voltage harmonic L1 display

The information are shown as below:

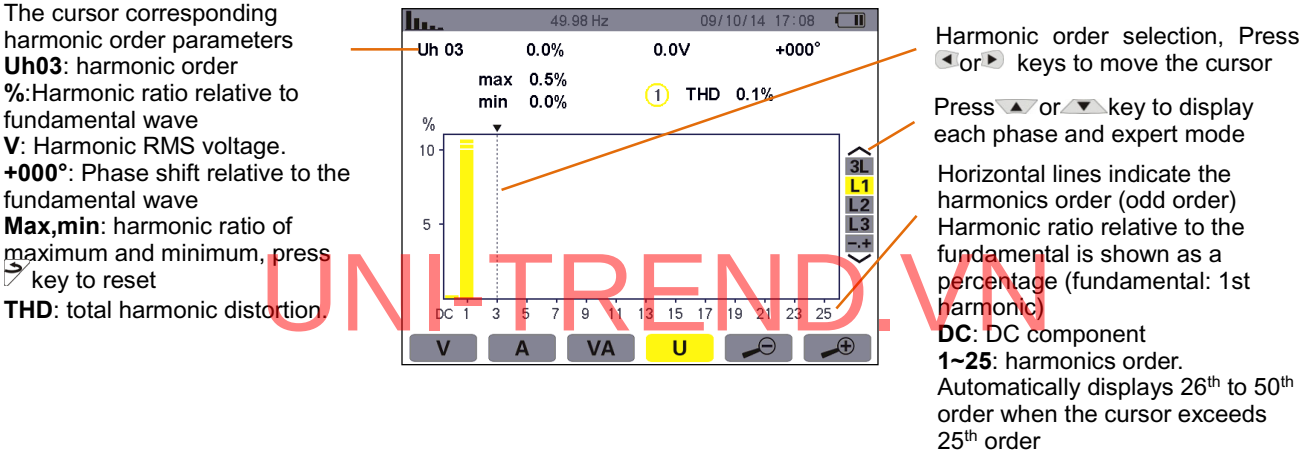


Figure 7-9: Line voltage harmonic L1 display screen

7.6. Expert Mode -.+

The expert mode is only available for 3-phase connections. This mode is used to show the harmonic effects of the neutral line heating or the rotating motors. Press the or keys to select the expert mode. The selected item -.+ will be highlighted in yellow and displays the expert mode on the screen.

In the expert mode screen, two sub-menus of V and A can be selected (refer to next page).

7.6.1. Expert mode display phase voltage V

Submenu shows the effect of phase voltage harmonics in neutral heating or in rotating motors.

The information are shown as below:

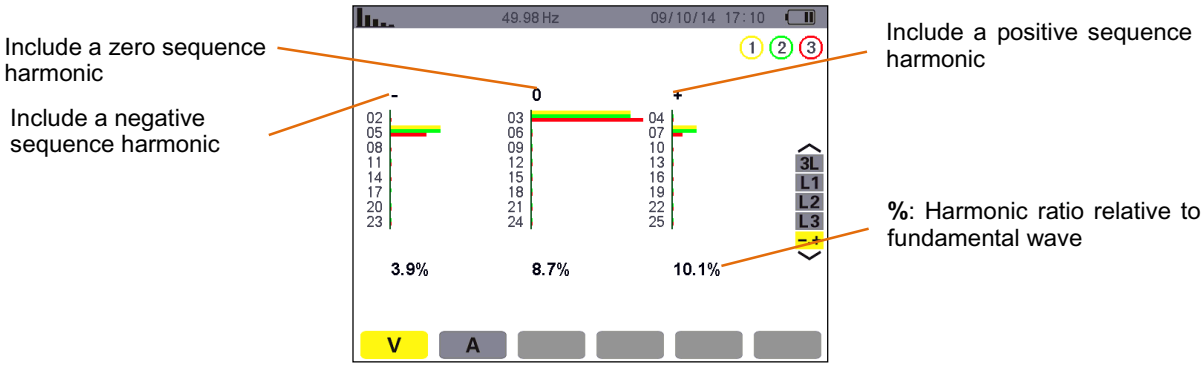


Figure 7-10: Phase voltage expert mode display

7.6.2. Expert mode display current A

Submenu shows the effect of current harmonics in neutral heating or in rotating motors.
The information are shown as below.

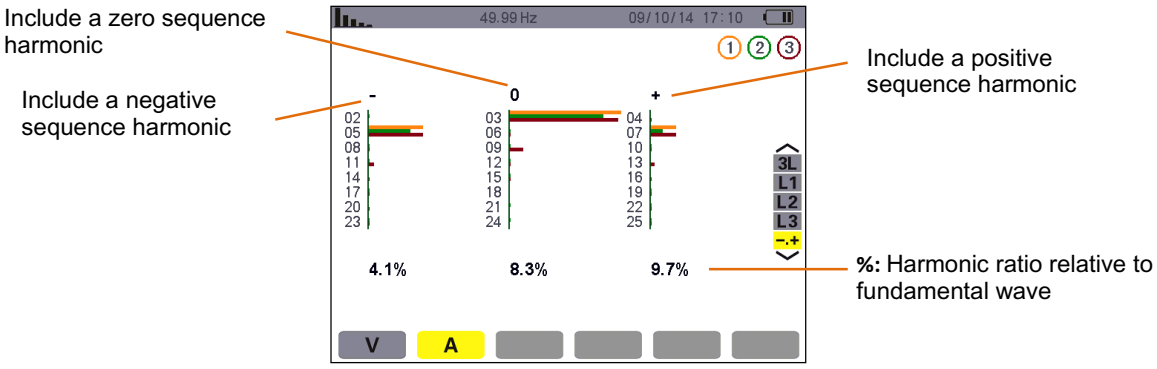


Figure 7-11: Current expert mode display

8. WAVEFORM MODE

In waveform mode, the Analyzer displays voltage and current curve chart, measured values and, calculated values (excluding power, energy and harmonics).

8.1. Select Sub-menus

The sub-menus are listed on the screen below and described individually in the paragraphs that follow.
Users can select the type of measurement by pressing the yellow function key at the bottom of the screen.

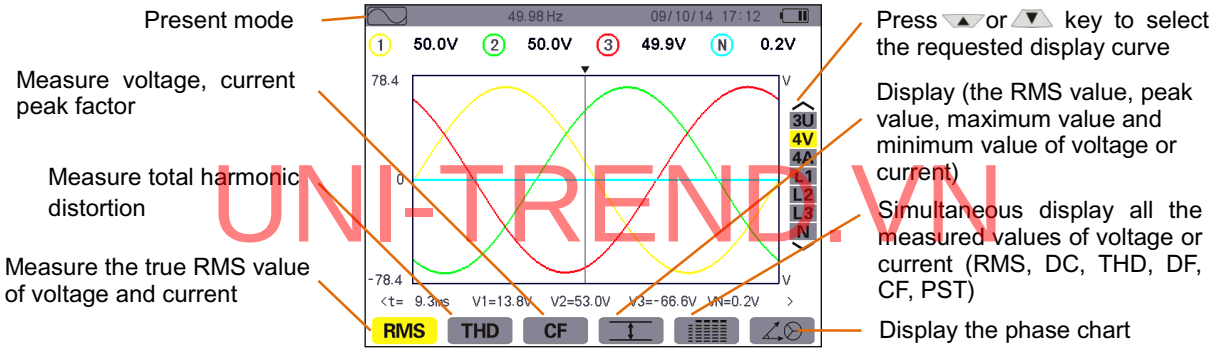


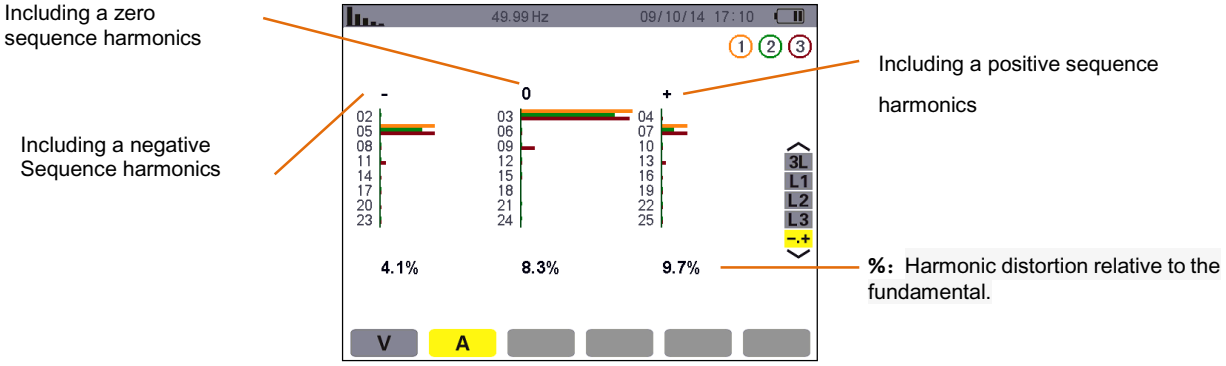
Figure 8-1: Waveform mode screen

8.2. True RMS RMS

The submenu can display the waveform of the measured signal and the true RMS value of voltage and current within a certain period of time.
Note: Which curve is displayed depends on the type of external wiring (refer to § 5.6):

- Single-phase: no choice (L1)
- 2-phase: 2V, 2A, L1, L2
- 3-phase, 3- or 4-wire: 3U, 3V, 3A, L1, L2, L3
- 3-phase 5-wire:
  ★For THD, CF and : 3U, 3V, 3A, L1, L2 and L3
  ★For RMS, and : 3U, 4V, 4A, L1, L2, L3 and N

The wiring type of the screen shown is 3-phase 5-wire.



8.2.1. 3U RMS display screen

The screen showed displays the 3-phase voltage of 3-phase system.
The information are shown as below:

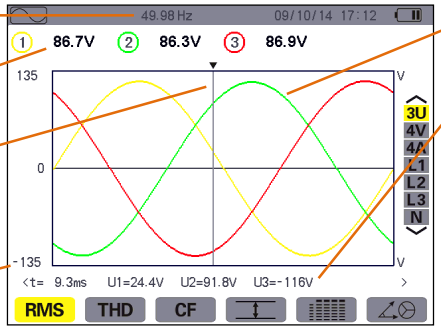


Figure 8-2: 3U RMS display screen

8.2.2. 4V RMS display screen

The screen showed displays the 3-phase phase voltage and neutral line to earth voltage of 3-phase system.
The information are shown as below:

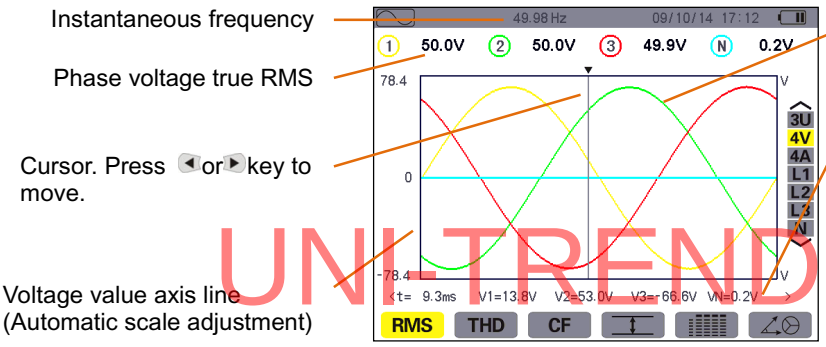


Figure 8-3: 4V RMS display screen

8.2.3. 4A RMS display Screen

This screen displays the three phase currents and the neutral current of three-phase system.
The information are shown as below:

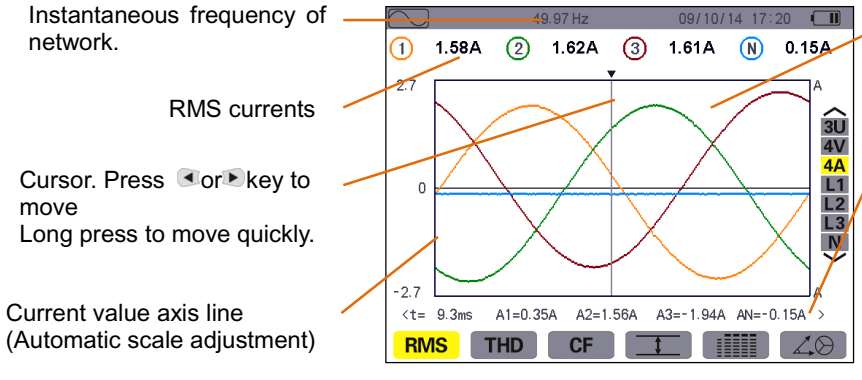


Figure 8-4: 4A RMS display screen

8.2.4 Neutral line RMS display screen

This screen displays current and earth voltage of neutral line.
The information are shown as below:

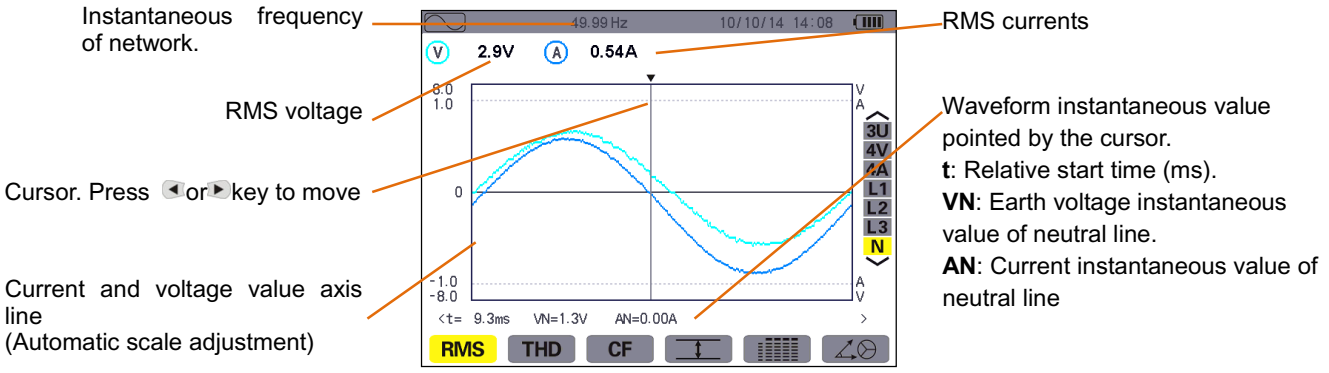


Figure 8-5: Neutral line RMS display screen

Note: L1, L2, and L3 display the current and voltage in phases 1, 2, and 3, respectively. The screen is identical to the one displayed for the neutral.

8.3. Total Harmonics Distortion THD

The THD submenu can display the measured signal waveform within a certain period of time and the total harmonic distortion rate of voltage and current.

8.3.1. 3U THD display screen

This screen displays the phase voltage waveforms and harmonic distortion rate within a certain period.
The information are shown as below:

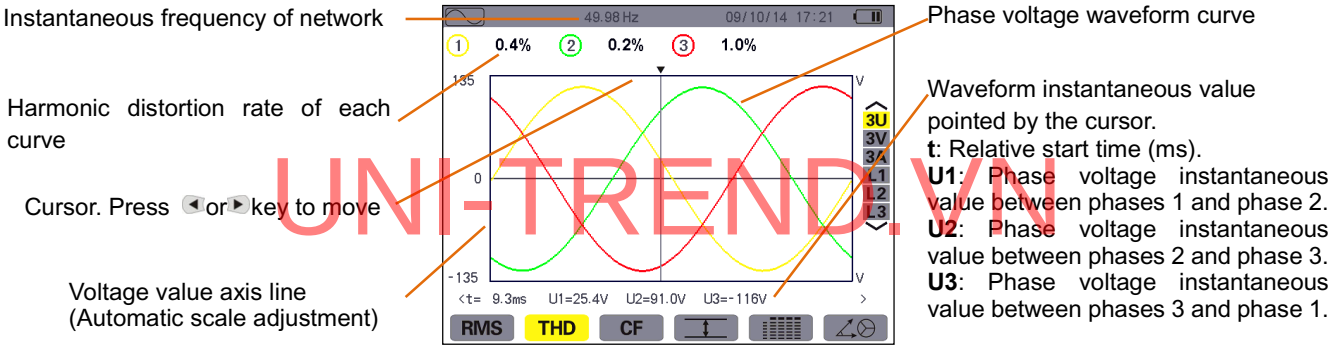


Figure 8-6: 3U THD display screen

8.3.2. 3V THD display screen

This screen displays the phase voltage waveforms and harmonic distortion rate within a certain period of time.
The information are shown as below:

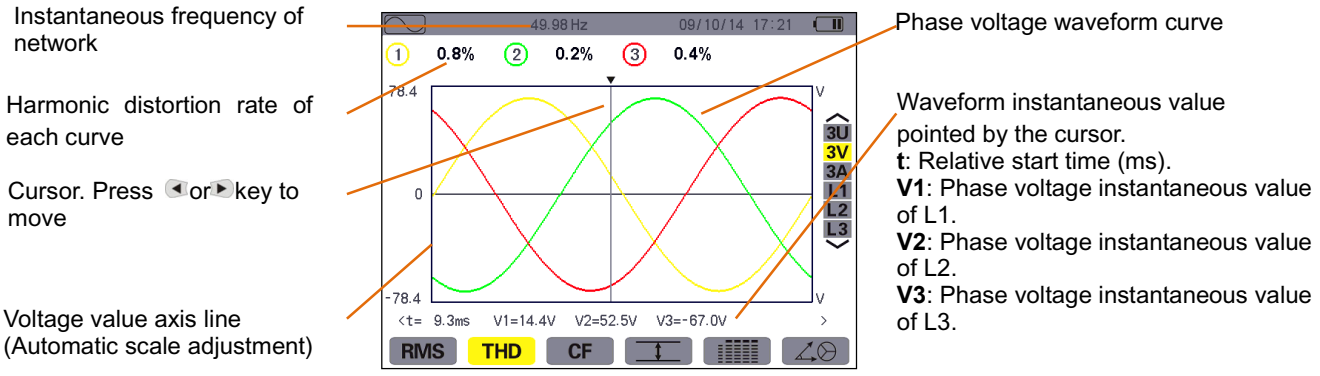
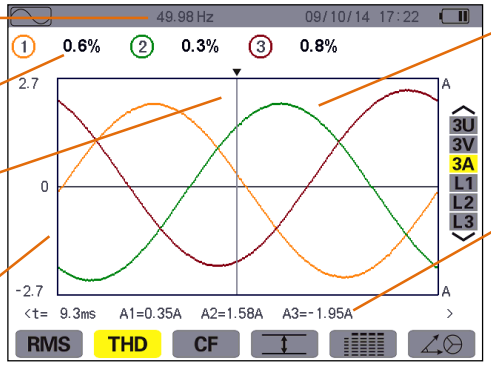


Figure 8-7: 3V THD display screen

8.3.3. 3A THD display screen

This screen displays the current waveforms and harmonic distortion rate within a certain period.
The information are shown as below:



Instantaneous frequency of network.

Harmonic distortion for each curve.

Cursor. Press ◄or►key to move

Current value axis line (Automatic scale adjustment)

Current waveform curve

Waveform instantaneous value pointed by the cursor.
t: Relative start time (ms).
A1: Current instantaneous value of L1.
A2: Current instantaneous value of L2.
A3: Current instantaneous value of L3.

Figure 8-8: 3A THD display scree

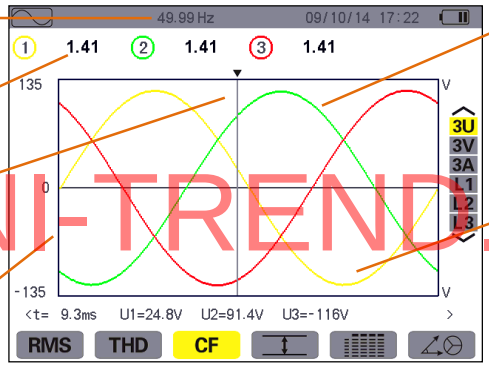
Note: L1, L2, and L3 display the total harmonic distortion rate of voltage and current for phases 1, 2and 3 respectively.

8.4. PEAK Factor CF

The CF submenu can display the measured signal waveform within a certain period of time and the peak factor of voltage and current.

8.4.1. 3U CF display screen

This screen displays the phase voltage waveforms and peak factor within a certain period.
The information are shown as below:



Instantaneous frequency of network.

Peak factor of each curve.

Cursor. Press ◄or►key to move

Voltage value axis line (Automatic scale adjustment)

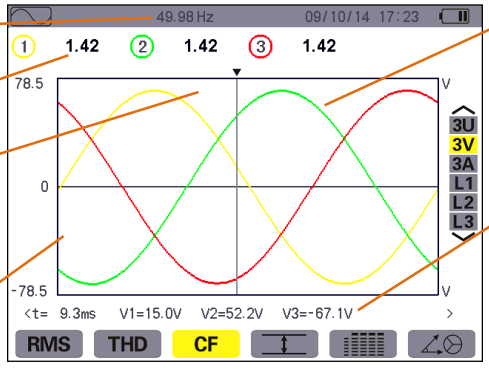
Phase voltage waveform curve

Waveform instantaneous value pointed by the cursor.
t: Relative start time (ms).
U1: Phase voltage instantaneous value between phases 1 and phase 2.
U2: Phase voltage instantaneous value between phases 2 and phase 3.
U3: Phase voltage instantaneous value between phases 3 and phase 1.

Figure 8-9: 3U CF display screen

8.4.2. 3V CF display screen

This screen displays the phase voltage waveforms and peak factor within a certain period.
The information are shown as below:



Instantaneous frequency of network.

Peak factor of each curve

Cursor. Press ◄or►key to move

Voltage value axis line (Automatic scale adjustment)

Phase voltage waveform curve

Waveform instantaneous value pointed by the cursor.
t: Relative start time (ms).
V1: Phase voltage instantaneous value of L1.
V2: Phase voltage instantaneous value of L2.
V3: Phase voltage instantaneous value of L3.

Figure 8-10:3V CF display screen

8.4.3. 3A CF display screen

This screen displays the current waveforms and peak factor within a certain period.
The information are shown as below:

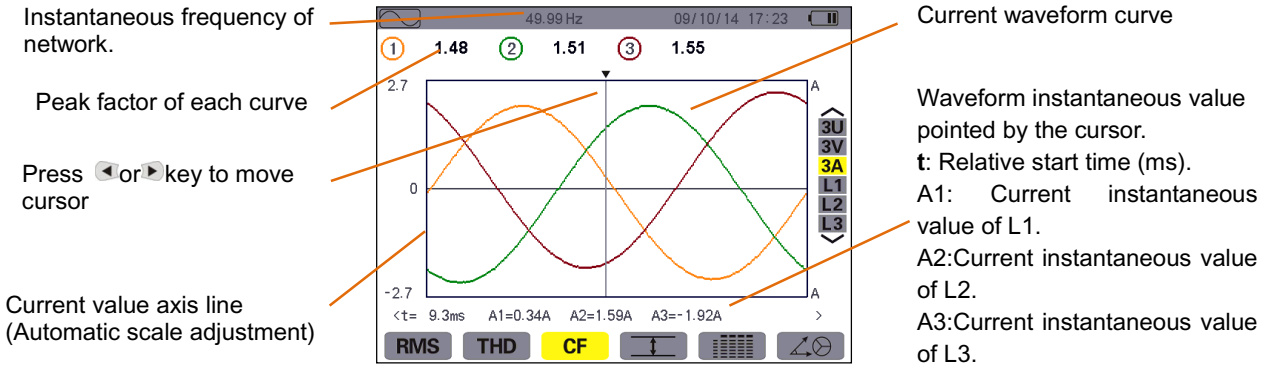


Figure 8-11: 3A CF display screen

Note: L1, L2, and L3 display the peak factor of voltage and current for phases 1, 2and 3 respectively.

8.5. Extreme & Average Values Of Voltage & Current

The Submenu can display the RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value of voltage and current.

8.5.1. 3U Max & Min value display screen

This screen displays the RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value of line voltage.

The information are shown as below:

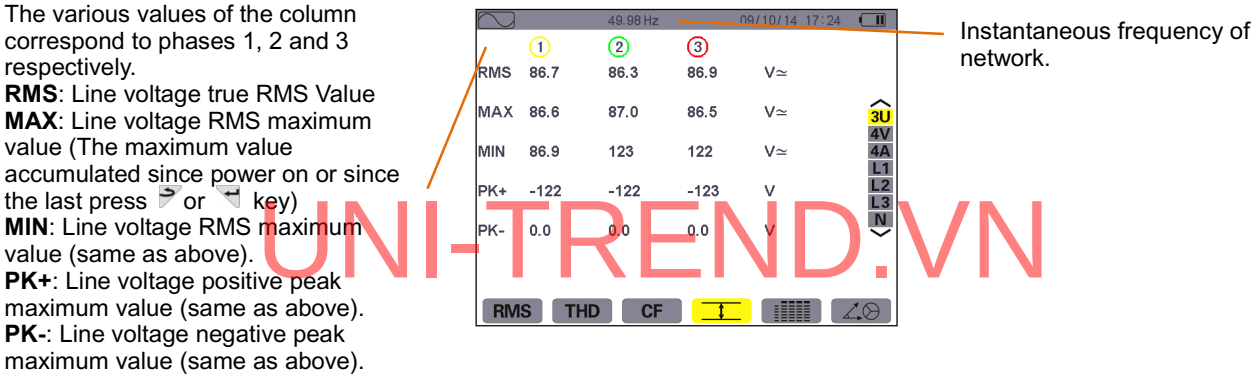


Figure 8-12: 3U Max & Min value display screen

Note: The Analyzer calculates the maximum and minimum values every half cycle (e.g. 10ms at 50Hz) and refreshes the measurement results every 300ms.

8.5.2. 4V Max & Min value display screen

This screen displays the RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value of phase voltage and neutral line voltage.

The information are shown as below:

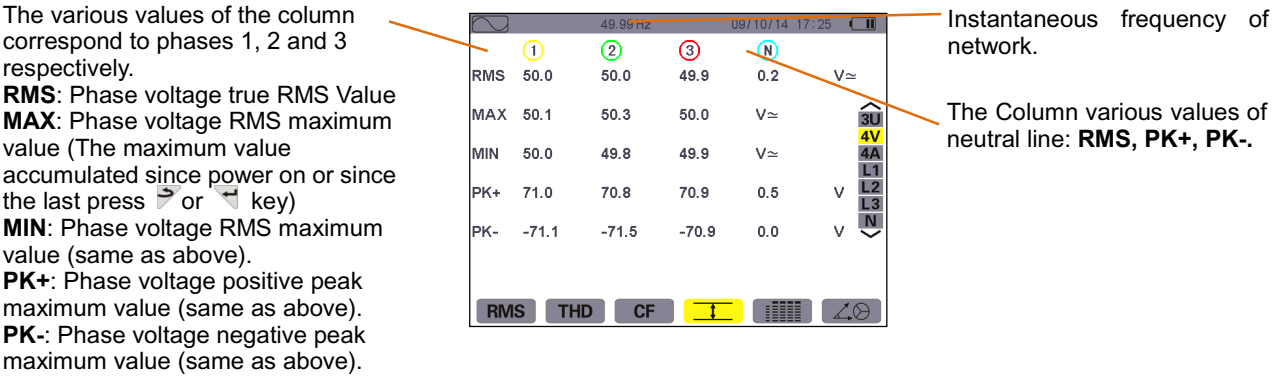


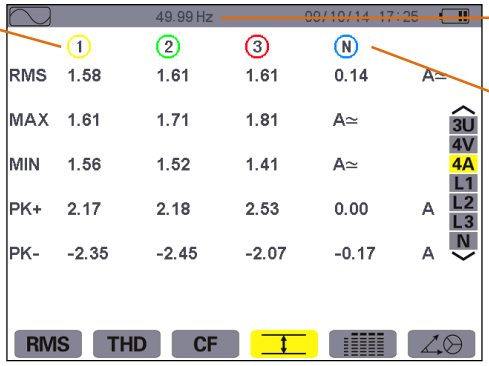
Figure 8-13: 4V Max&Min. value display screen

Note: The Analyzer calculates the maximum and minimum values every half cycle (e.g. 10ms at 50Hz) and refreshes the measurement results every 300ms.

8.5.3. 4A Max & Min value display screen

This screen displays the RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value of current and neutral line current.
The information are shown as below:

The various values of the column correspond to phases 1, 2 and 3 respectively.
RMS: Current true RMS Value
MAX: Current RMS maximum value (The maximum value accumulated since power on or since the last press or key)
MIN: Current RMS maximum value (same as above).
PK+: Current positive peak maximum value (same as above).
PK-: Current negative peak maximum value (same as above).



Instantaneous frequency of network

The Column various values of neutral line: **RMS, PK+, PK-.**

Figure 8-14: 4A Max & Min value display screen

Note: The Analyzer calculates the maximum and minimum values every half cycle (e.g. 10ms at 50Hz) and refreshes the measurement results every 300ms.

8.5.4. L1 Max & Min value display screen

This screen displays the RMS value, maximum value, minimum value, positive peak maximum value, negative peak minimum value of phase voltage and current.
The information are shown as below:

Voltage values column.
RMS: Phase voltage true RMS Value
MAX: Phase voltage RMS maximum value (The maximum value accumulated since power on or since the last press or key)
MIN: Phase voltage RMS maximum value (same as above).
PK+: Phase voltage positive peak maximum value (same as above).
PK-: Phase voltage negative peak maximum value (same as above).

Current value column: Same as voltage value for each parameter information

Figure 8-15: L1 Max & Min. value display screen

Note: The Analyzer calculates the maximum and minimum values every half cycle (e.g. 10ms at 50Hz) and refreshes the measurement results every 300ms.
L2, L3, and N respectively display the earth voltage and current RMS value, maximum value, minimum value, positive peak value, and negative peak value of phase 2, phase 3, neutral line, and the relevant information display is same as L1.

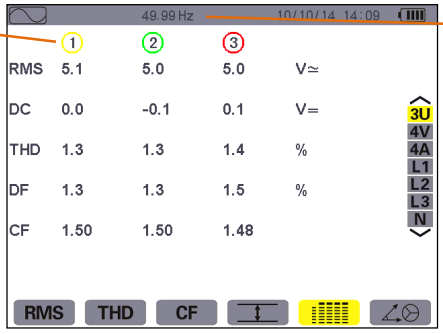
8.6. Various Test Value Displayed Simultaneously

The submenu displays all of the voltage and current measurement values (RMS, DC, THD, DF, CF, PST, KF).

8.6.1. Simultaneous display of various values in 3U

This screen displays the RMS, DC, THD, DF, and CF values of the line voltages.
The information are shown as below:

The various values of the column correspond to phases 1, 2 and 3 respectively.
RMS: True RMS value of 1s
DC: DC component.
THD: Total harmonic distortion.
DF: Distortion factor.
CF: peak factor of 1s



Instantaneous frequency of network

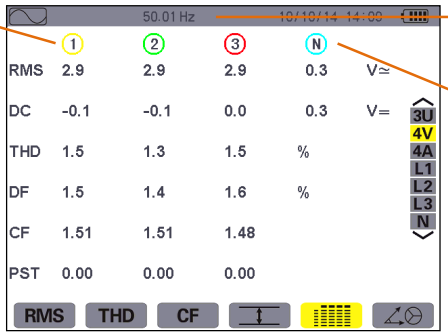
Figure 8-16: Simultaneous display of various values in 3U

8.6.2. Simultaneous display of various values in 4V

This screen displays the RMS, DC, THD, DF, CF and PST values of the phase voltages and neutral line voltage.

The information are shown as below:

The various values of the column correspond to phases 1, 2 and 3 respectively.
RMS: True RMS value of 1s
DC: DC component.
THD: Total harmonic distortion.
DF: Distortion factor.
CF: peak factor of 1s
PST: short-time voltage flicker (10 minutes).



Instantaneous frequency of network.

The Column various values of neutral line: **RMS, DC**

Figure 8-17: Simultaneous display of various values in 4V

8.6.3. Simultaneous display of various values in 4A

This screen displays the RMS, DC, THD, DF, CF, and KF values of the phase current and neutral line currents.

The information are shown as below:

The various values of the column correspond to phases 1, 2 and 3 respectively.
RMS: True RMS value of 1s
DC: DC component.
THD: Total harmonic distortion.
DF: Distortion factor.
CF: peak factor of 1s
KF: transformer K factor

Instantaneous frequency of network.

Neutral values: **RMS.**

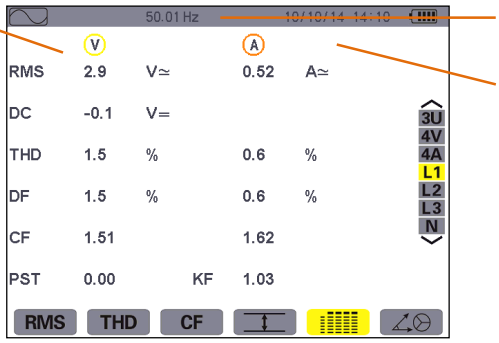
Figure 8-18: Simultaneous display of various values in 4A

8.6.4. Simultaneous display of various values in L1

This screen displays the RMS, DC, THD, DF, CF of phase 1 voltage, and DC, PST parameters of voltage, KF value of current.

The information are shown as below:

The various values of the column correspond to phases 1, 2 and 3 respectively.
RMS: True RMS value of 1s
DC: DC component.
THD: Total harmonic distortion.
DF: Distortion factor.
CF: peak factor of 1s
PST: short-time voltage flicker (10 minutes).



Instantaneous frequency of network.

Current values.
RMS: true RMS value for 1s
THD: total harmonic distortion.
DF: distortion factor.
CF: peak factor of 1s
KF: transformer K factor.

Figure 8-19: L1 Simultaneous display of various values

Note: L2 and L3 display the voltage and current various values of phase 2 and phase 3 respectively, and the relevant information display is same as L1.

8.6.5. Simultaneous display of various values of neutral line

This screen displays the voltage RMS, DC value and the current RMS value of neutral line.

8.7. Phasor Diagram Display

The submenu shows the absolute value, phase and unbalance of the voltage or current at the basic frequency.

8.7.1. Display of phasor diagram in 3V

This screen displays the absolute value of the phase voltage, the phase angle of the phase voltage relative to the current and the unbalance of the phase voltage at the basic frequency.
The information are shown as below:

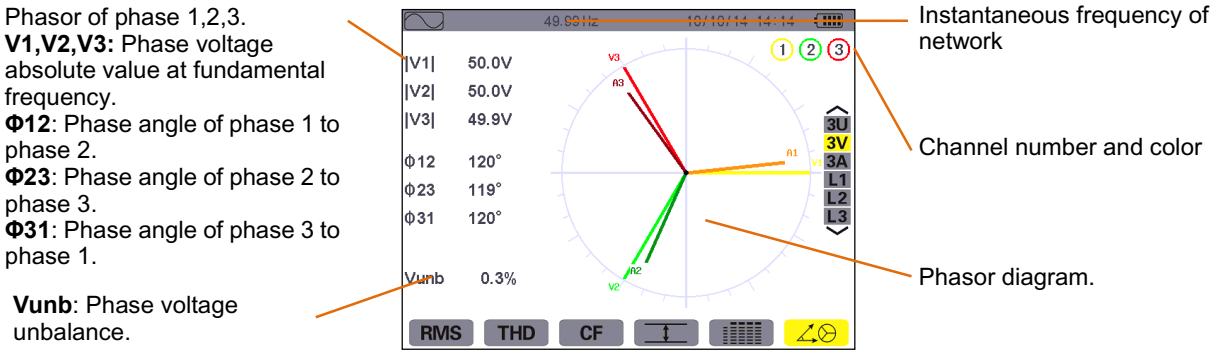


Figure 8-20: Display of phasor diagram in 3V

8.7.2. Display of phasor diagram in 3U

This screen displays the absolute value, the phase angle between the line voltages, and the unbalance of the line voltage at the base frequency.
The information displayed on this screen is same as the information described in Section 8.7.1, and the only difference is that the displayed values are related to the line voltage of 3U.

8.7.3. Display of phasor diagram in 3A

This screen displays the absolute value, the phase angle between each phase current and the unbalance of the current at the base frequency.
The information displayed on this screen is same as the information described in Section 8.7.1, the only difference is that the displayed values are related to the line voltage of current.

8.7.4. Display of phasor diagram in L1

This screen displays the absolute value of the voltage and current of phase 1, and the phase angle of the phase 1 voltage relative to the current at the fundamental frequency.
The information are shown as below:

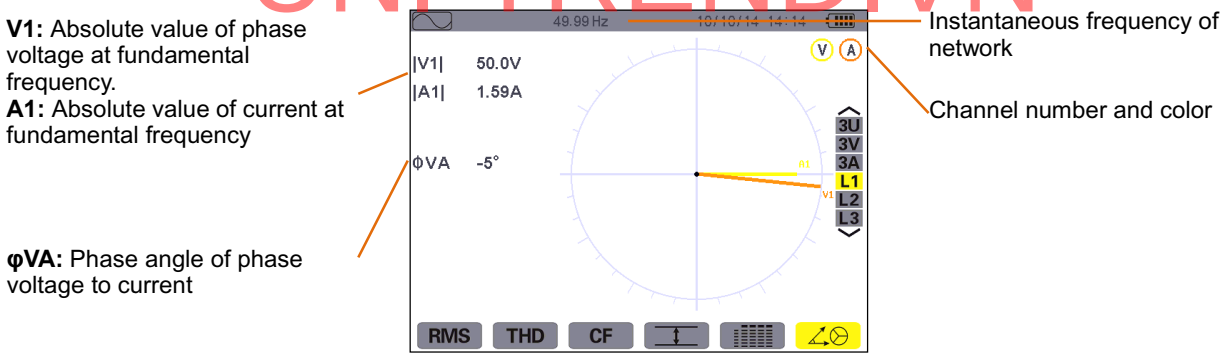


Figure 8-21: phasor diagram display screen of L1

Note: L2 and L3 respectively display the absolute value of the voltage and current of phase 2 and phase 3 and the phase angle of the corresponding phase voltage to current at the fundamental frequency, and the display of relevant information is same as L1.

9. ALARM MODE

In the alarm mode, the Analyzer can monitor whether each measured value exceeds the threshold and generate alarm log. The values that can be monitored are: Vrms, Urms, Arms, PST, Vcf, Ucf, Acf, Vunb, Aunb, Hz, KF, Vthd, Uthd, Vdf, W, VAR, VA, DPF, PF, Vh, Uh, Ah, Vah, etc.
The user should set an alarm threshold (hysteresis) first and then can start the alarm monitoring .The monitored values:
★Defined in the Set/Alarm Mode screen (Section 5.10).
★Select the setting parameter group (solid red dot means selected; hollow red circle means unselected).
The Analyzer can record up to 12800 alarm logs: the user can upload the stored alarm records to the PC and save them for later retrieval and viewing.

9.1. Submenus

All submenus of alarm mode are listed on the screen as shown in the figure below, and the following chapters will introduce respectively.

The user can press each yellow function key on the keyboard below the screen to select the corresponding submenu.

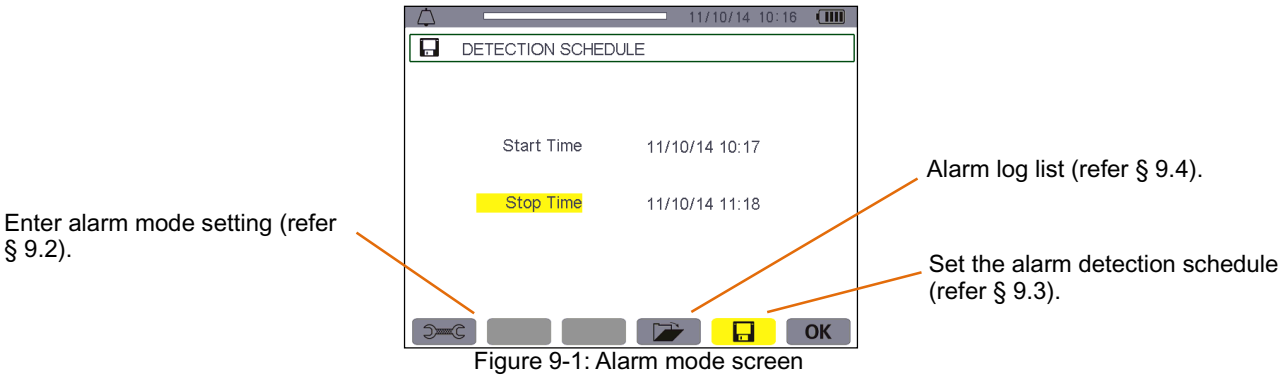


Figure 9-1: Alarm mode screen

OK and ✋ symbols have the following functions:

★**OK**: Confirm alarm detection settings and start alarm detection (refer § 9.3.2).

★✋: Actively stop alarm detection (refer § 9.3.3).

9.2. Alarm Mode Setting

The submenu displays the list of alarm settings (refer 5.10). Press this key to define or modify the alarm settings.

The information are shown as below:

Figure 9-2: Alarm mode setting

Reminder: Use the ▲ ▼ ◀ ▶ keys to view various values.

Set the alarm step as follows:

★ Press ↵ to select field value. And ▲▼ arrow appears.

★ Press ▲ or ▼ to input value (Vah, Ah, Uh, etc.), and press ↵ key to confirm.

Set other values as same operation.

★ Move yellow cursor to the first column, then press ↵ key to select the set alarm. Red solid dot indicates selected. When the condition is met, the setting alarm can be triggered, and the alarm log is generated.

Note: Repeating step 3 can cancel the selected alarm.

★Press ↩ key to return to the alarm detection schedule screen.

9.3. Alarm Detection Schedule

The submenu sets the start time and end time of the alarm schedule.

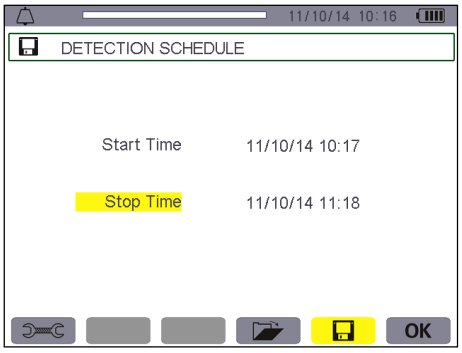


Figure 9-3: Alarm detection schedule screen

9.3.1. Step1: Set the alarm schedule

Detailed operations as follows:

■ Press ▲ or ▼ key to select the start time (highlighted in yellow), and press ↵ to start setting time. The corresponding time and date area will display the arrows ▲▼.

Press ▲ or ▼ to increase or decrease each value, then press ◄ or ► key to select the request modify value.

Note: The alarm start time must be later than present time.

■ Press ↵ to confirm the alarm start time setting.

■ Press ▲ or ▼ key to select the stop time setting (highlighted display). Press ↵ to set the stop time. The corresponding time and date area will display arrows ▲▼.

Press ▲ or ▼ to increase or decrease each value, then press ◄ or ► key to select the request modify value.

Note: The alarm start time must be after present time.

■ Press ↵ to confirm the alarm stop time setting.

9.3.2. Step2: Start alarm detection

Press the **OK** icon function key and the Analyzer starts alarm detection with the set start and stop time.

- The **OK** icon disappears and the ✋ icon appears at same place.
- When waiting to start detection, the Analyzer screen displays "detection standby..." and the 💾 icon flashes on top of screen.
- When the alarm detection starts, “detecting....” will be displayed.
- When alarm detection is completed, “detection schedule” will be displayed again, and the **OK** icon is displayed. User can set the new alarm detection.

9.3.3. Voluntary stoppage of alarm campaign

Before the stop time of alarm is reached, the user can press the ✋ icon yellow function key (lower right of the screen) to actively stop the alarm detection, and the OK icon will be displayed again at the same position after stopping.

9.4. View Alarm Log

The 📂 submenu displays the alarm log. The Analyzer can store up to 12,800 alarm logs. Press the 📂 icon yellow function key to view the alarm log.

Note: In ⊃⊂ mode, the selected wiring type will not influence each phase selection and parameters monitoring of alarm, users decide the selection.

Each data information shown as follow:

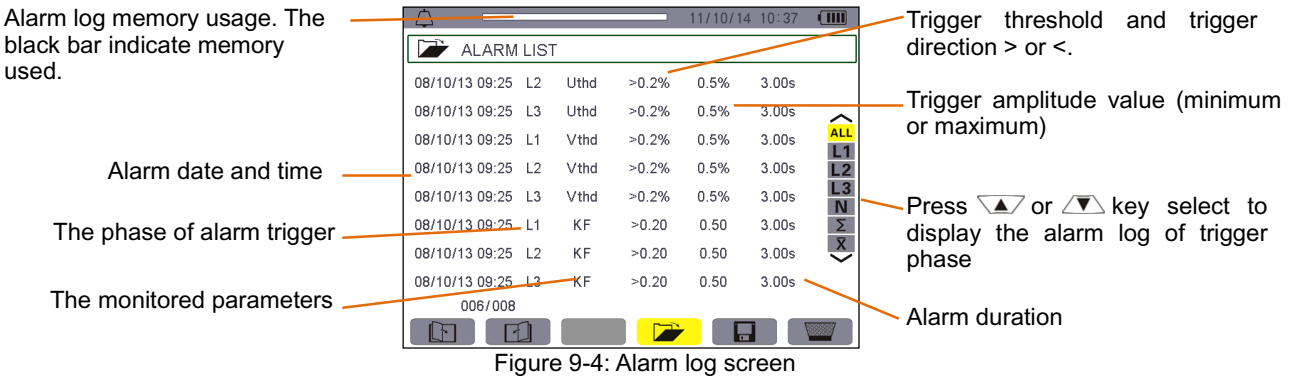


Figure 9-4: Alarm log screen

Reminder: The default units of the monitored parameters and corresponding trigger thresholds and trigger amplitudes in the alarm log are as follows:

Table 9-1

Monitored parameters	Default units	Units with the suffix	Example
Arms	A	m: mean mA k: mean kA	2.5: mean 2.5A 423m: mean 423mA

Vrms/Urms	V	k: mean kV	326: mean 326V 1.2k: mean 1.2kV
W/VAR/VA	W/Var/VA	K: mean kW/kVar/kVA M: mean MW/MVar/MVA	W parameter: 315 mean 315W W parameter: 5.8k mean 5.8kW
Hz	Hz		50.00: mean 50.00Hz

9.5. Delete Alarm Log

The submenu can delete all the alarm log. Detailed operation steps as follows:
Press yellow function key to select the submenu. The icon displayed in yellow indicates ready to delete, then press the yellow function key to cancel the delete state. The icon displayed in gray indicates not delete.
In the state of ready to delete, press key to confirm delete and all the alarm logs will be deleted and cleared.

Figure 9-5: Alarm log screen in delete mode

10. TREND MODE

In trend mode, the Analyzer can record the measured parameters selected in Set/Trend mode. (Refer § 5.9).

10.1. Select Submenus

The submenus are shown in the below screen, and described in the follow sections.
Users can use the yellow function keys at the bottom of the screen to select the corresponding submenu.

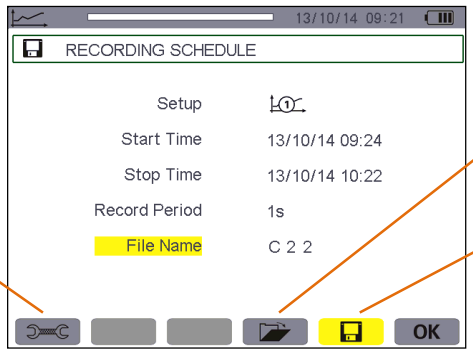


Figure 10-1 Trend mode screen

Press **OK** icon yellow function key to start trend record monitoring (refer § 10.2).

10.2. Presets & Starts Record Trend Charts

The submenu specifies the parameters of the new record detection schedule.

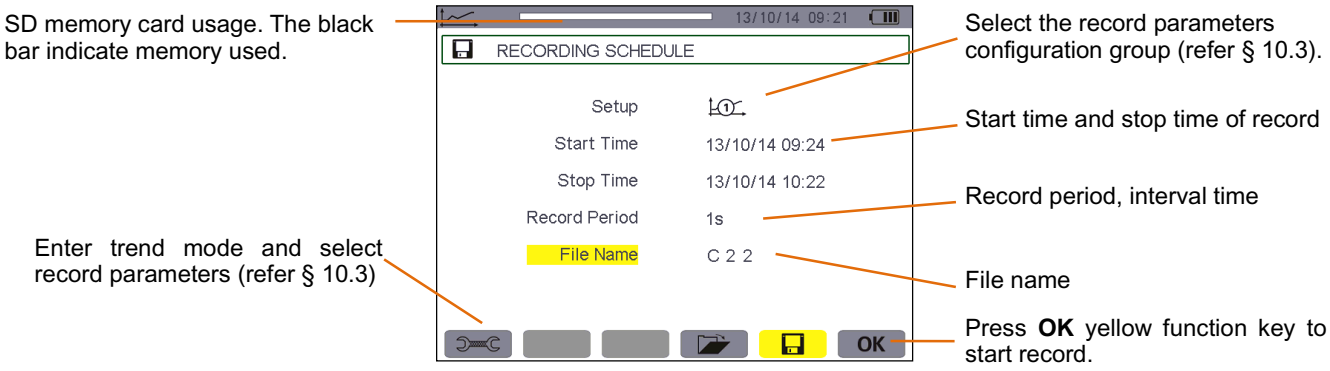


Figure 10-2: Preset record screen

10.2.1. Stage 1: Set the measurement parameters of requesting record

Operate as follows:

■ Press ▲ or ▼ keys to select the requested setting parameters area. The selected area is highlighted in yellow. Press ↵ to enter the setting, and arrows ▲▼ appears.

■ Press ▲ or ▼ keys to select the parameters setting group form ① to ④, then press ↵ to confirm.

Reminder: Parameter setting groups from ① to ④ are all set in the setting/trend mode (refer §5.9). Users can also refer to §10.3 for the parameters selection and setting steps instruction of trend chart.

■ Press ▲ or ▼ keys to select the "**Start Time**", and the selected field will be highlighted in yellow. Press ↵ to enter and display arrows ▲▼ when setting the start date and time. Press ▲ or ▼ to increase or decrease the value, press ◄ or ► to switch year, month, day, hour, minute etc.

Note: The start date and time must be later than the present date and time.

■ Press ↵ to confirm the "**Start Time**" of record.

■ Press ▲ or ▼ keys to select "**Stop Time**", and the selected field will be highlighted in yellow. Press ↵ to enter and display arrows ▲▼ when setting the stop date and time. Press ▲ or ▼ to increase or decrease the value, press ◄ or ► to switch year, month, day, hour, minute etc.

Note: The stop date and time must be later than the start date and time. For the longest recording time, please refer to § 10.6.4.

■ Press ↵ to confirm the "**Stop Time**" of record.

■ Press ▲ or ▼ keys to select "**Record Period**", press ↵ key to enter and display arrows ▲▼.

■ Press ▲ or ▼ to increase or decrease the values (optional value:1 s, 5 s, 20 s, 1 min, 2 min, 5 min, 10 min, or 15 min).

■ Press ↵ to confirm the "**Record Period**" setting.

Note: The record interval period is the average interval cumulative time for measuring each recorded value (that is, the interval of recording data once).

■ Press ▲ or ▼ to select the "File Name" and the file name are will be highlighted in yellow, press ↵ to enter the edit mode to enter the file name (The length should not exceed 8 characters. Different names should be used for the records, and there should be no spaces in the middle of the file name).

The available characters are the letters from A to Z and the digits from 0 to 9. Use the ▲ or ▼ keys to display a character and ◄ or ► key move to the next character.

■ Press ↵ key to confirm the "File Name".

10.2.2. Stage 2: Start recording

■ Press **OK** icon yellow function key (the bottom right corner of the screen), then the Analyzer starts recording with the start and stop times set by the user.

The **OK** icon disappears and the ✋ icon appears instead in this time.

■ The Analyzer displays "Recording stand by..." before reaching the start time and the 💾 icon continues flashing in the screen's top display bar.

The Analyzer will display "Recording..." after reaching the start time.

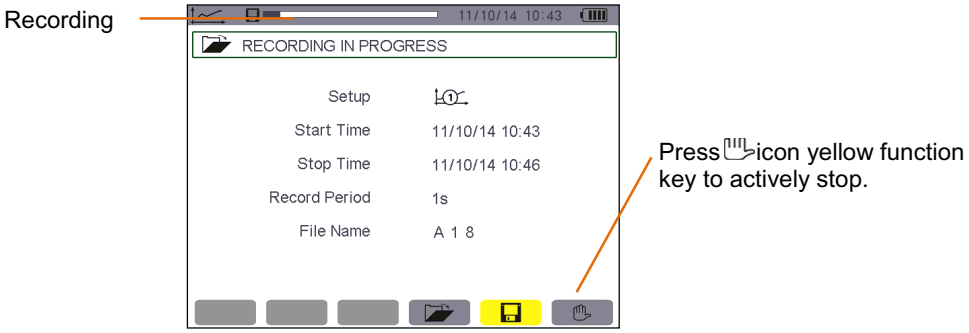


Figure 10-3: A trend chart monitoring display screen

■ The “Recording Schedule” screen and **OK** icon will appear again (bottom right corner of the screen) after reaching the stop time, and the recording will be stopped automatically. The **OK** icon reappears at corresponding position.

10.2.3. Active stop present record

Before reaching the set stop time, press icon yellow function key (the bottom right corner of the screen), then the recording will be stopped automatically, and the **OK** icon will reappear.

10.3. Trend Chart Monitoring Parameter Setting

This submenu displays the selection list of trend chart monitoring parameters (refer to §5.9), and the user can set and change the monitoring parameter selection by using this shortcut key.
The information are shown as below:

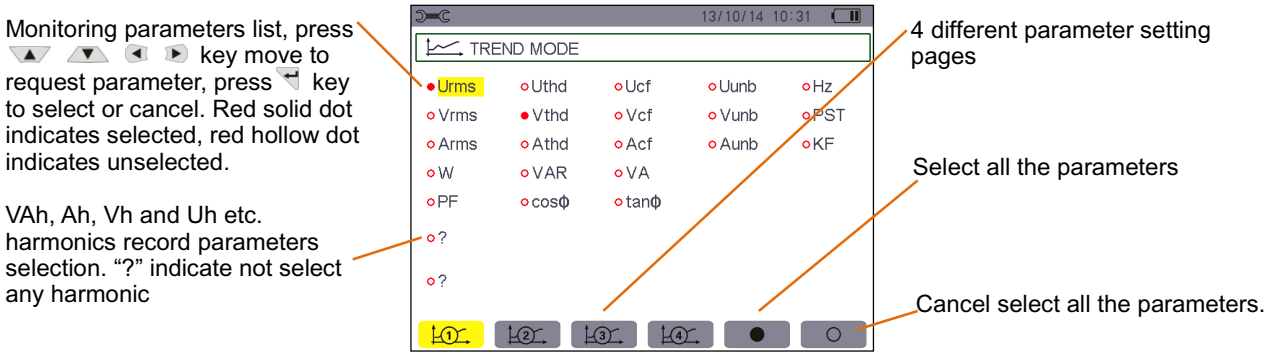


Figure 10-4: Trend chart monitoring parameter setting screen

Set a record operation as follows:
Example for parameter setting group 1:
■ Press icon yellow function key, with the display highlighted in yellow.
■ Press or and or keys to select parameters, then press to confirm, and display with red solid dot
Reminder: User can select the following parameters:

Unit	Designation
Urms	RMS phase-to-phase voltage (2 , 3).
Uthd	Total harmonic distortion of the phase-to-phase voltage (2 , 3).
Ucf	Crest (peak) factor of phase-to-phase voltage (2 , 3).
Uunb	Phase-to-Phase voltage unbalance (2 , 3).
Hz	Frequency of power grid.
Vrms	RMS phase-to-neutral voltage.
Vthd	Total harmonic distortion of the phase-to-neutral voltage.
Vcf	Crest factor of phase-to-neutral voltage.
Vunb	Phase-to-neutral voltage unbalance (2 , 3).
PST	Short-term flicker.
Arms	RMS current.
Athd	Total harmonic distortion of the current.
Acf	Crest factor of current.
Aunb	Current unbalance (2 , 3).
KF	K factor.
W	Active power.
VAR	Reactive power.
VA	Apparent power.

PF	Power factor.
Cosφ	Phase shift of power factor.
Tanφ	Tangent.
?	See comment below.

Specific function of the last two lines.
The position as follow:

○?

○?

Figure 10-5: These two lines involve harmonics

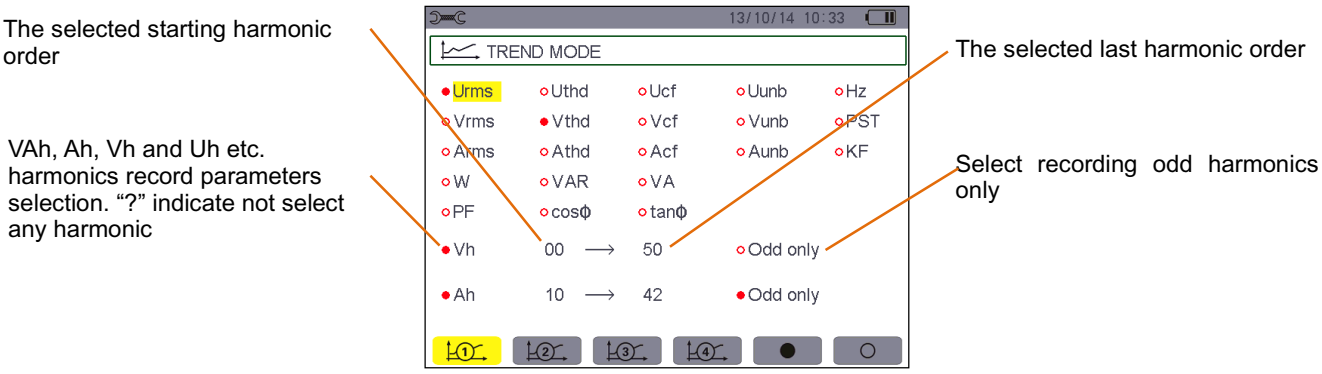


Figure 10-6: Recording the setting of harmonic parameters in trend mode

These two lines involve the recording of 4 different harmonics, as Vah, Ah, Vh, and Uh. For each harmonic, the user can select the desired recording harmonic order (0^{th}-50^{th}), or only record odd harmonics. The operation is as follows:

■ Enter the desired record parameters: The cursor will be highlighted in yellow. Press and then the arrows ▲▼ appear. Select the value (Vah, Ah, Vh, and Uh) for which harmonics are to be recorded by pressing or . The red solid dot identifies your selection.
Confirm by pressing . The values field is highlighted in yellow.
■ To select the starting harmonic order: With the field highlighted in yellow, press and then the arrows ▲▼ appear, select the order from which the harmonics are to be recorded by pressing or , then validate by pressing .
Press or to go to the next field.
■ To select the last harmonic: With the second field (greater than or equal to the starting harmonic order) highlighted in yellow, press . Select the highest harmonic order to be recorded by pressing or , then validate by pressing .
Press or to go to the next field.
■ For the odd harmonic only:
To select or deselect this function, press . The red solid dot identifies your selection:
★ Selected: Only odd harmonics between the two orders of harmonics specified in the previous points are recorded.
★ Not selected: All harmonics (even and odd) between the two orders of harmonics specified in the previous points are recorded.

10.4. View Record List

The submenu displays recordings already made. Press the yellow key corresponding to the icon to view the list.
The data shown as follow:

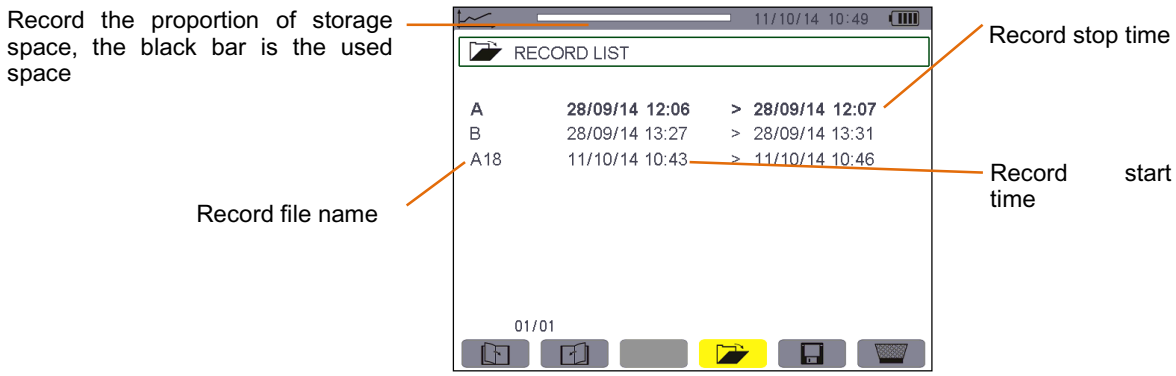


Figure 10-7: Record list display screen

10.5. Delete Record

The submenu is used to delete the records. Operate as follows:

- Press or key to select the record to be deleted. The selected record is bolded.
- Press key to select the submenu. The icon displayed yellow indicates ready to delete, and press the function key to cancel the delete state. The icon displayed gray indicates not delete.
- In the state of ready to delete, press key to delete the selected record.

Figure 10-8: Record list screen in delete mode.

10.6. Display Records

10.6.1. Record information

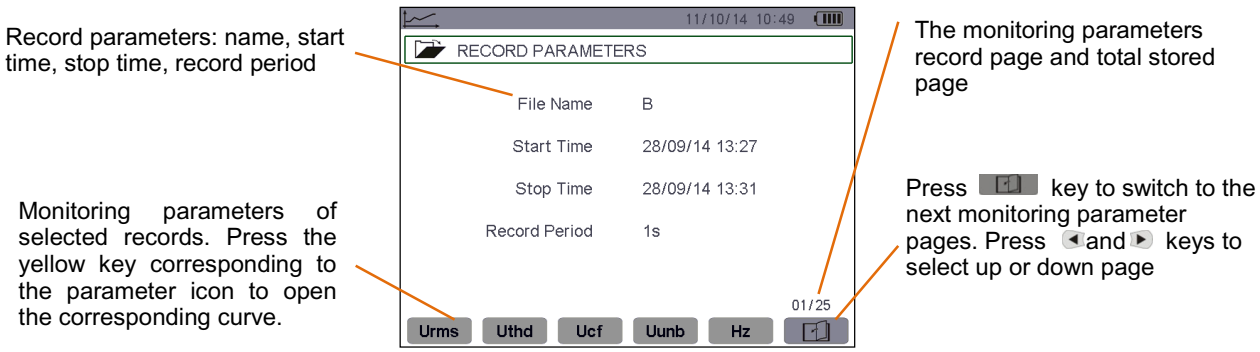


Figure 10-9: Trend mode record list sub menu screen

10.6.2. Trend curves record

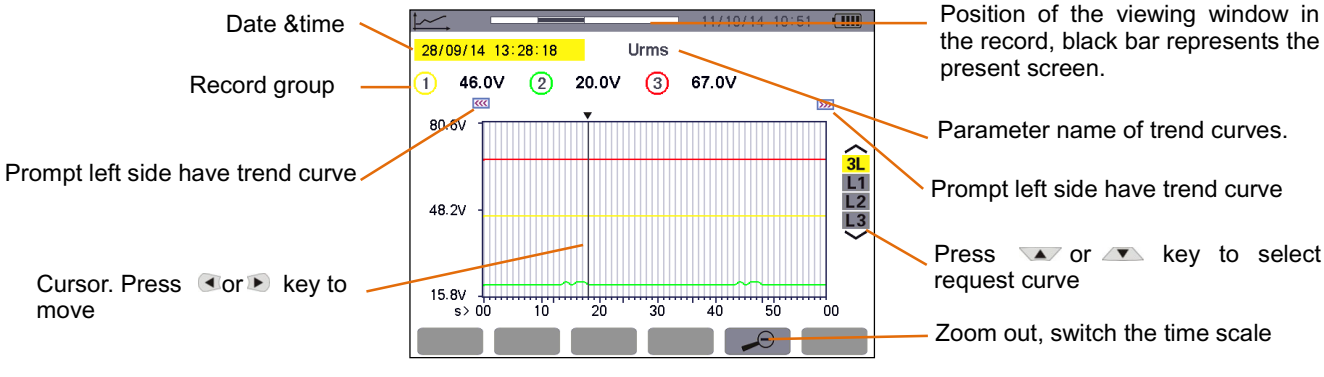


Figure 10-10: Trend curve record screen

Remark: The cursor position "----" indicates errors or missing values in the record.
When the curve display period is 20 seconds. Since the period of the record is one second, each point of this curve corresponds to a value recorded in a one-second window once 20 seconds. There is therefore a substantial loss of information (19 values out of 20), but the display is rapid.
With the increase of the display period, the loss values will be more. This case the user can select to activate the MIN-AVG-MAX mode. After the MIN-AVG-MAX mode is activated, each point of the curve represents the mean of the total sampling points every period (such as the display period is 20 seconds, sampling period is 1 second, each display point of the curve represents the mean of 20 values recorded every second.).

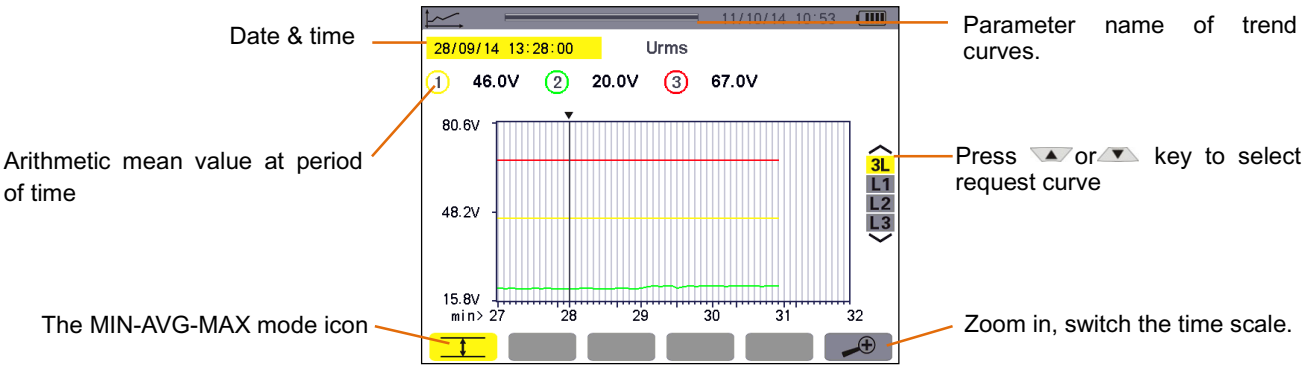


Figure 10-11: Vrms with MIN-AVG-MAX

Since the MIN-AVG-MAX mode is enabled, each point on the curve represents the arithmetic mean value within the display period, so the display is more accurate and there is no data loss, but the display speed is relatively slow (For display time, refer §10.6.3).

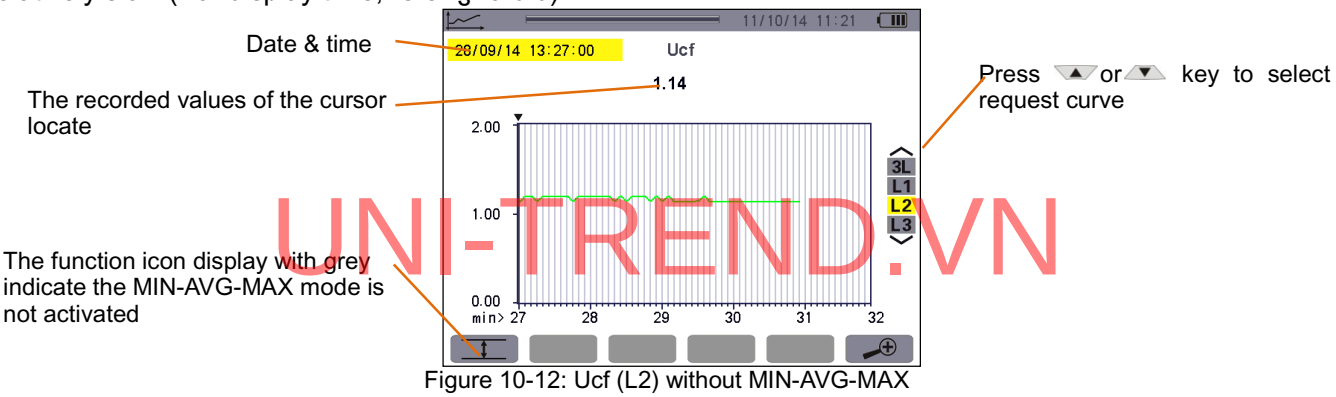


Figure 10-12: Ucf (L2) without MIN-AVG-MAX

When the MIN-AVG-MAX mode is not activated, display the curve of 60 values recorded of the cursor, the display is rapid.

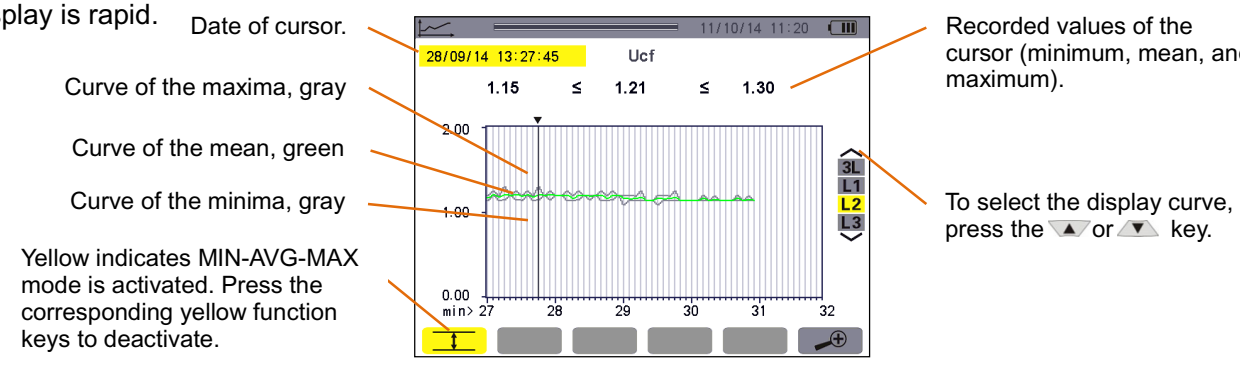


Figure 10-13: Ucf (L2) with MIN-AVG-MAX

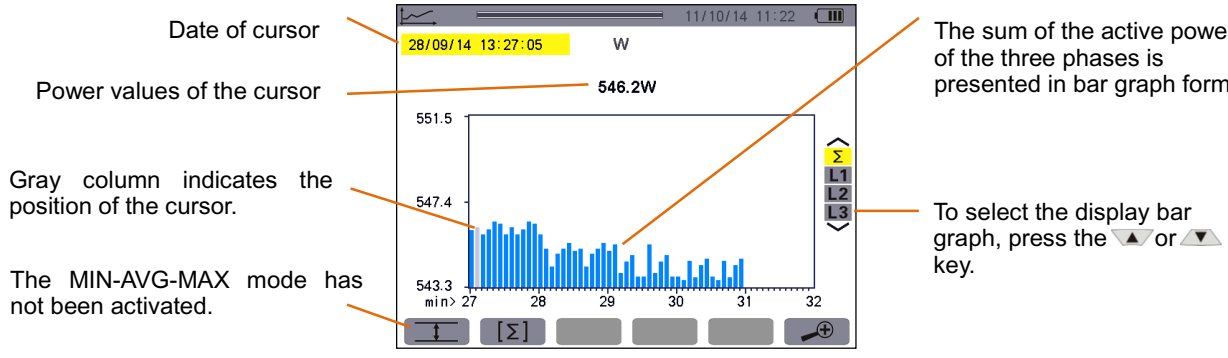


Figure 10-14: total active power without MIN-AVG-MAX

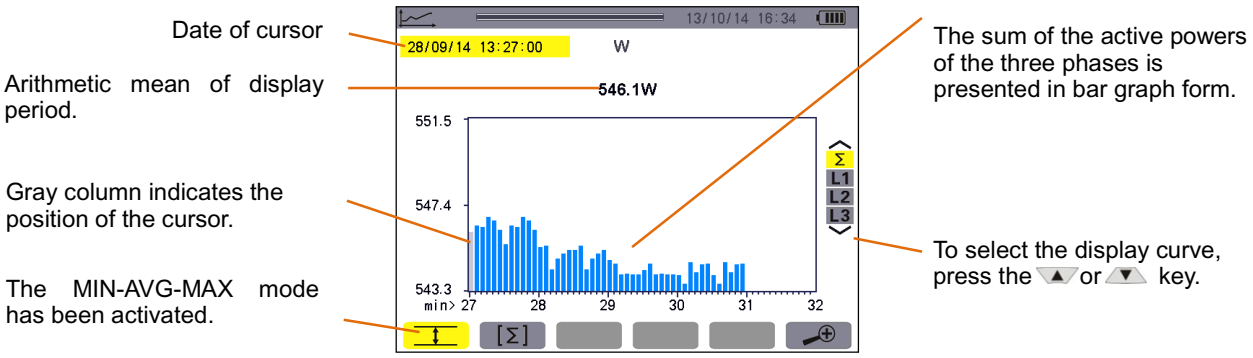


Figure 10-15: Total active power with MIN-AVG-MAX

This curve differs slightly from the previous one because, with the MIN-AVG-MAX mode, there is no loss of information.

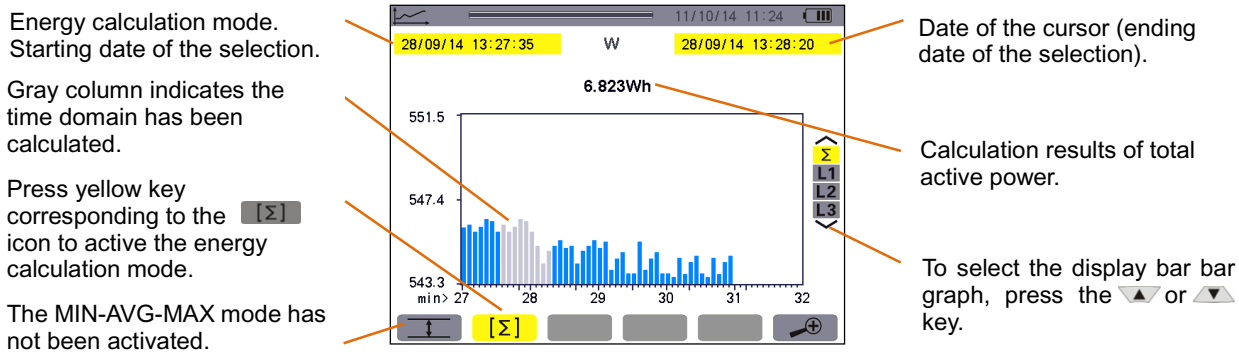


Figure 10-16: Total active energy without MIN-AVG-MAX

Energy calculation steps:

■ Press yellow key corresponding to the [Σ] icon to active the energy summation mode. The current cursor time is the starting time of the energy calculation.

■ Press the ◄ or ► to move the cursor. Calculate the time of the cursor to which the stop time points. The device calculates the energy between the start time and stop time automatically.

Note: The location of the starting time cannot be exceeded when the cursor moves leftwards.

10.6.3. The time of displaying the curve in the different scale

The following table indicates the time needed to display the curve on screen as a function of the width of the display window for a recording period of one second:

Time Span	Unit Time	Waiting time
5 days	2 hours	30 seconds
2.5 days	1 hour	15 seconds
15 hours	15 minutes	4 seconds
10 hours	10 minutes	2 seconds
5 hours	5 minutes	1 second
1 hour	1 minutes	1 second
20 minutes	10 seconds	1 second
5 minutes	5 seconds	1 second
1 minute	1 second	1 second

■ Press the ⊕ or ⊖ key to change the scale of the display

■ Press the ◄ or ► key to move the cursor

■ Press the ▲ or ▼ key to change the display phase curve.

■ Above operation may restart the loading/calculation of the values from the beginning.

10.6.4. The longest recording time can be programmed

The longest time is based on the number of the recording parameters selection and the sampling period, the typical condition as follows:

Parameter of selected	Sampling period	Typical longest time can be programmed

All parameters (total 123)	1 second	10 days
1~20 parameters	1 second	62 days
All parameters (total 123)	5 seconds	50 days
1~20 parameters	5 seconds	300 days
All parameters (total 123)	1 minutes	600 days
1~20 parameters	1 minutes	3600 days

The above table indicates that, the less the selected parameters, the greater the sampling period, and the longer the longest recording time.

11. POWER AND ENERGY MODE W

The W key displays power and energy measurements.

11.1. Sub-menus

The sub-menus are listed in the screen below and described individually in the paragraphs that follow.
The sub-menus are selected using the yellow keys on the keypad below the screen.

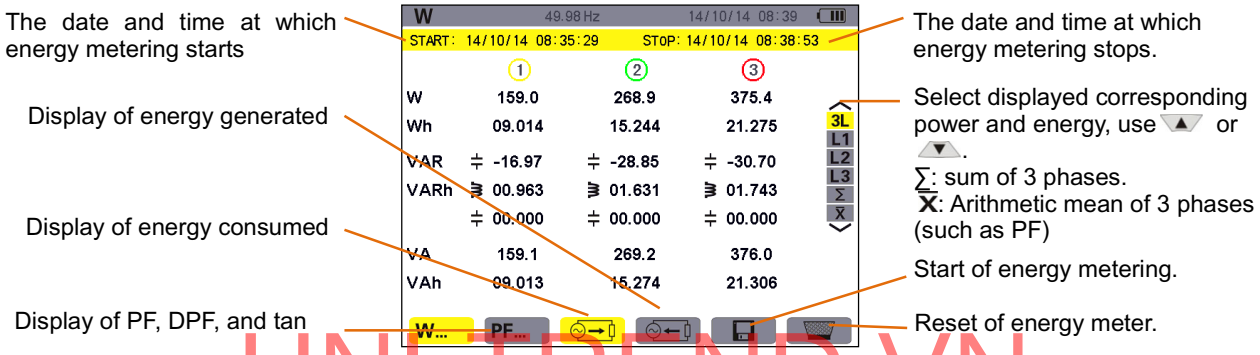


Figure 11-1: The Power and energy mode screen

11.2. Energy Consumed

The sub-menu displays active power, reactive powers (capacitive and inductive), and apparent power.

11.2.1. The energies consumed screen for the 3 phases (3L)

This screen displays the following information:

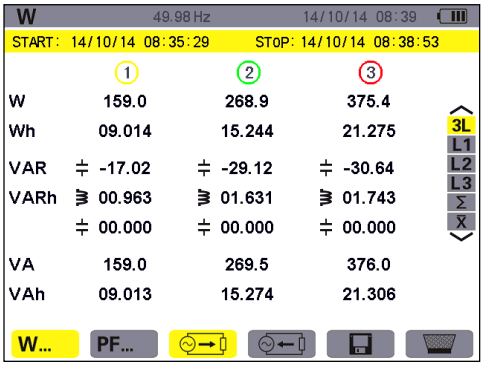


Figure 11-2: The energies consumed screen for the 3 phases (3L)

Unit	Designation
W	Active power.
Wh	Active energy consumed.
VAR	Reactive power (inductive or capacitive).
VARh	Reactive energies consumed (inductive or capacitive).
VA	Apparent power.
VAh	Apparent energy consumed.

11.2.2. The energies consumed screen for phase L1

This screen displays the following information:

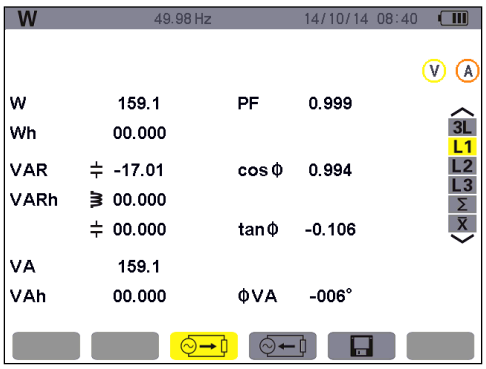


Figure 11-3: The energies consumed screen for phase L1

Unit	Designation
W	Active power.
Wh	Active energy consumed.
VAR	Reactive power (inductive ≷ or capacitive ∓).
VARh	Reactive energies consumed (inductive ≷ or capacitive ∓).
VA	Apparent power. (: sum of 3 phases)
VAh	Apparent energy consumed.
PF	Power factor.
Cosφ	Phase shift of power factor
Tanφ	Tangent factor
φVA	Phase shift of phase-to-neutral voltage with respect to current.

Note: Filters L2 and L3 display the same information for phases 2 and 3. ∑ screen displays total power and energy consumed values for the 3 phases.

11.3. Power Factor Display Screen PF...

This screen page is available only with the 3L filter. To display the information, press the yellow key on the keypad corresponding to the PF... icon.

The following data is displayed:

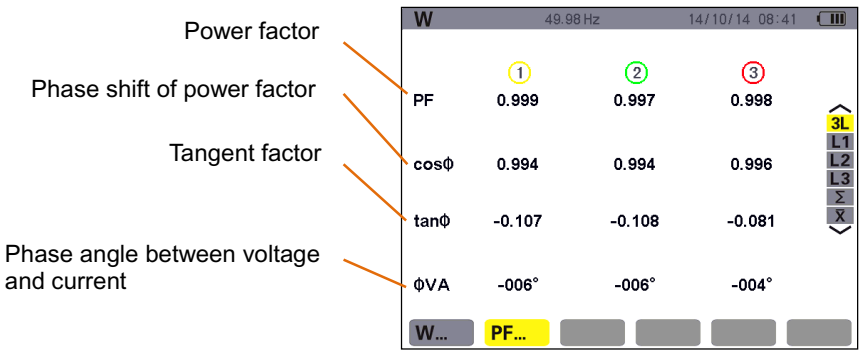


Figure 11-4: Power factor screen for the 3 phases (3L)

11.4. The Sums Of Energies Consumed Display Screen

To display the information, select the ∑ icon of the right-hand filter. This screen displays the following information:

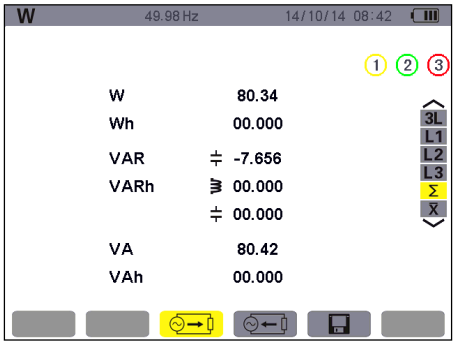


Figure 11-5: The sums of energies consumed display screen

Unit	Designation
W	Total active power.
Wh	Total active energy consumed.
VAR	Total reactive power, inductive ≷ or capacitive ∓.
VARh	Total reactive energies consumed, inductive ≷ or capacitive ∓.
VA	Total apparent power.
VAh	Total apparent energy consumed.

11.5. The Arithmetic Mean Values Of Power Factor Display Screen

To display the arithmetic mean values for the 3 phases (for power factor, phase shift of power factor and tangent), select the $\bar{X}$ icon of the right-hand button.
This screen displays the following information:

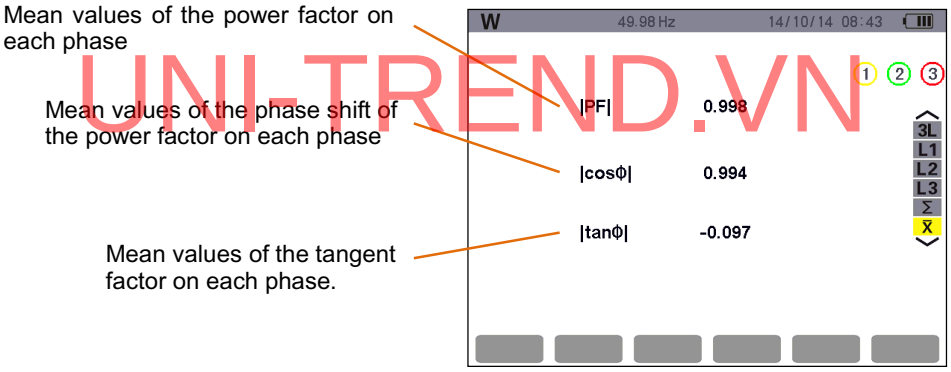


Figure 11-6: Arithmetic mean values screen for the 3 phases

11.6. Energy generate

The sub-menu displays the active power, the reactive powers (capacitive and inductive), the apparent power, and all associated energies generated.

11.6.1. The energies generated screen for the 3 phases (3L)

This screen displays the following information:

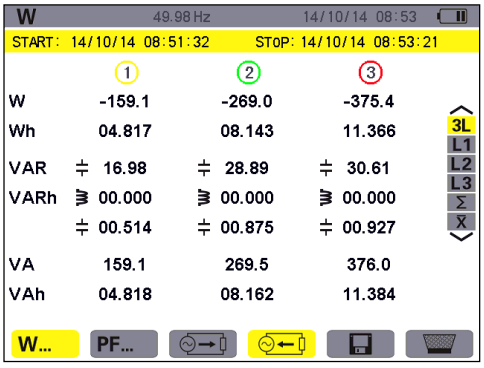


Figure 11-7: Energies generated screen for the 3 phases (3L)

Unit	Designation
W	Active power.
Wh	Active energies generated.
VAR	Total reactive power, inductive ⋹ or capacitive ∓.
VARh	Total reactive energies generated, inductive ⋹ or capacitive ∓.
VA	Total apparent power.
VAh	Total apparent energy generated.

11.6.2. The energies generated display for phase L1

This screen displays the following information:

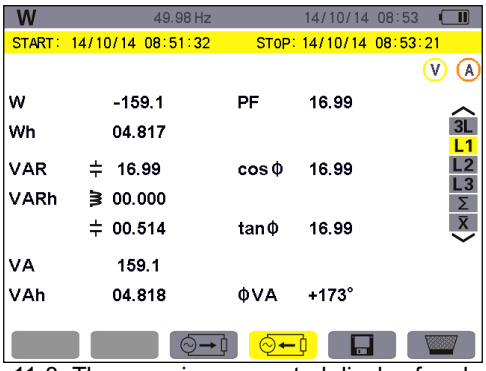


Figure 11-8: The energies generated display for phase L1

Unit	Designation
W	Active power
Wh	Active energies generated
VAR	Total reactive power, inductive ⋹ or capacitive ∓
VARh	Total reactive energies generated, inductive ⋹ or capacitive ∓
VA	Total apparent power.
VAh	Total apparent energy generated.
PF	Power factor
Cosφ	Phase shift of power factor.
Tanφ	Tangent factor
φVA	Phase angle between voltage and current

Note: Filters L2 and L3 display the same information for phases 2 & 3. The screen displays total power and energy generated values for the 3 phases.

11.6.3. The sums of energies generated display screen

To display the information, select the icon.
This page displays:
★The total active power,
★The total active energy generated,
★The total reactive power, inductive ⋹ or capacitive ∓,
★The total reactive energies generated (inductive ⋹ and capacitive ∓),
★The total apparent power,
★The total apparent energy generated.

11.7. Starting Energy Metering

To start metering, press the yellow key on the keypad corresponding to the icon:

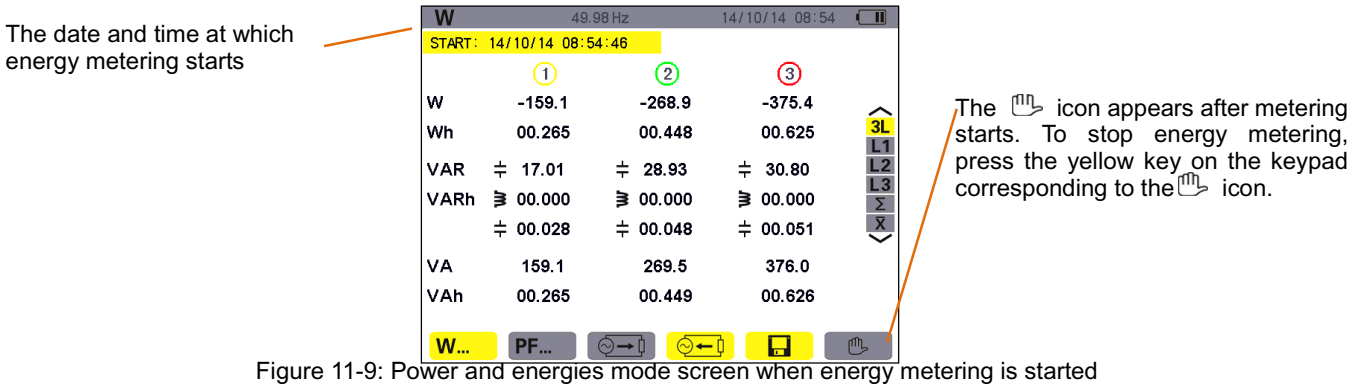


Figure 11-9: Power and energies mode screen when energy metering is started

11.8. Stopping Energy Metering

To stop energy metering, press the yellow key on the keypad corresponding to the icon.

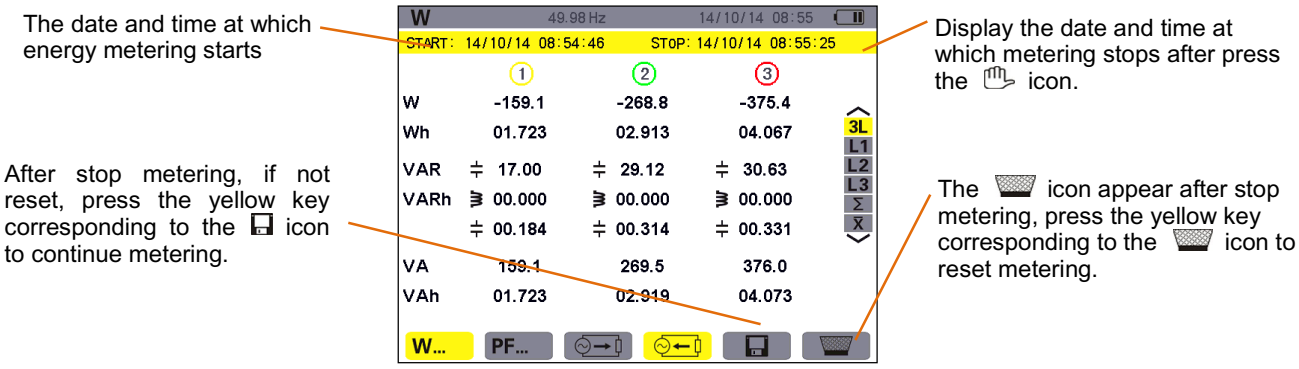


Figure 11-10: Power and energies mode screen when energy metering is stop

11.9. Reset Of Energy Metering

To reset metering, press the yellow key on the keypad corresponding to the icon, The icon displayed yellow indicate ready to delete, then press the yellow key corresponding to the icon to cancel the delete state.

In the state of ready to delete, press the key to confirm. All energy values (consumed and generated) are reset. Note: refer to the 4-quadrant power diagram in § 17.3.

12. SCREEN SHOT MODE

The key can be used to:

★Capture a maximum of 60 screens for future reference (see §12.1).

★Display previously saved screen snapshots (see § 12.2).

Saved screens may then be transferred to a PC using the USB.

12.1. Screen Snapshots

Press for approx. 3 seconds to take any screenshot (including the , , W, , , and mode screens).

During the capture, the icon appears in the top left corner of the screen instead of the icon for the active mode (, , W, , , ,). The active mode icon reappears when you release the key: the device has saved the image.

Reminder: The device can save a maximum of 60 screen snapshots. If the user attempts to take a 61st screen snapshot, first, upload the pictures you need to the computer through USB, then delete the device's snapshots before capturing new pictures.

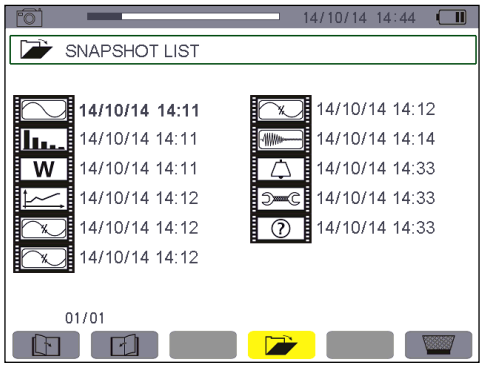


Figure 12-1: The snapshot list display screen

12.2. Handling Of Screen Snapshots

This handling concerns stored screen snapshots, i.e.:
★Display of the list of screen snapshots (see § 12.2.2).
★Viewing of one of the screen snapshots (see § 12.2.3).
★Deletion of one or more of the screen snapshots (see § 12.2.4).

12.2.1. Available functions

To enter screen snapshot mode, briefly press the key.
Reminder: Holding the key down for approximately 3 seconds triggers the screen snapshot function (See § 12.1).

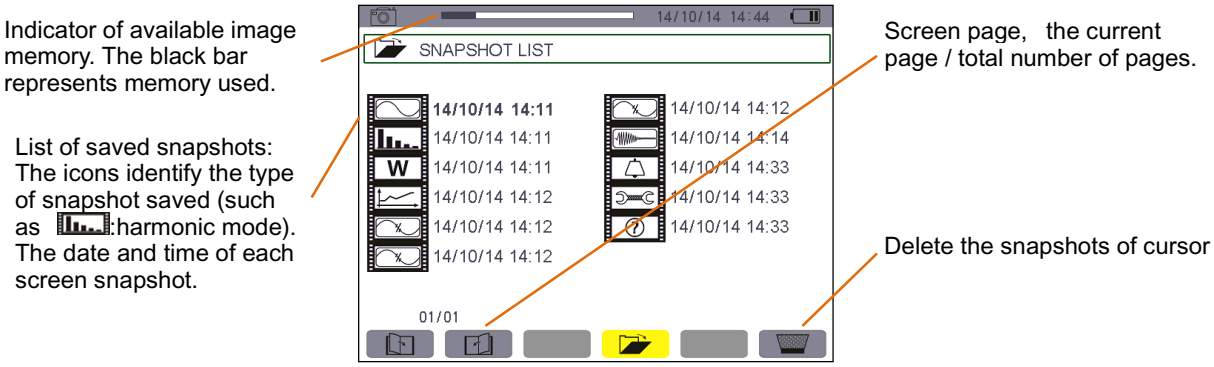


Figure 12-2: Example of the snapshot list display screen

12.2.2. Viewing the list of snapshots

Press briefly to display this list. The screen presents the list of snapshots (see figure 12-2).

12.2.3. Viewing a snapshot from the list

To view a snapshot, proceed as follows:
★ Press . The icon is active and the snapshot list screen is displayed (see figure 12-2).
★ Select the snapshot to be viewed using the or and or keys. The date and time of the selected snapshot are bolded.
★ Press to display the selected snapshot. The top left corner of the screen displays the icon, alternating with the icon corresponding to the active mode (such as :harmonic mode).
★ Press to return to the list of screen snapshots.

12.2.4. Deleting a snapshot from the list

To delete a snapshot, proceed as follows:
From the list of snapshots (see Figure 12-2 for example).
★ Select the snapshot to be deleted using the or and or keys. The date and time of the selected snapshot are bolded.
★ Press the yellow key on the keypad corresponding to the icon, the icon displayed yellow indicates ready to delete, then press the yellow key corresponding to the icon to cancel the delete state.
★ In the state of ready to delete, press the key to confirm.
Press to delete the selected snapshot. The snapshot is deleted from the list.

13. HELP

The key provides information about the functions and symbols used in the current display mode.
The following information is displayed:

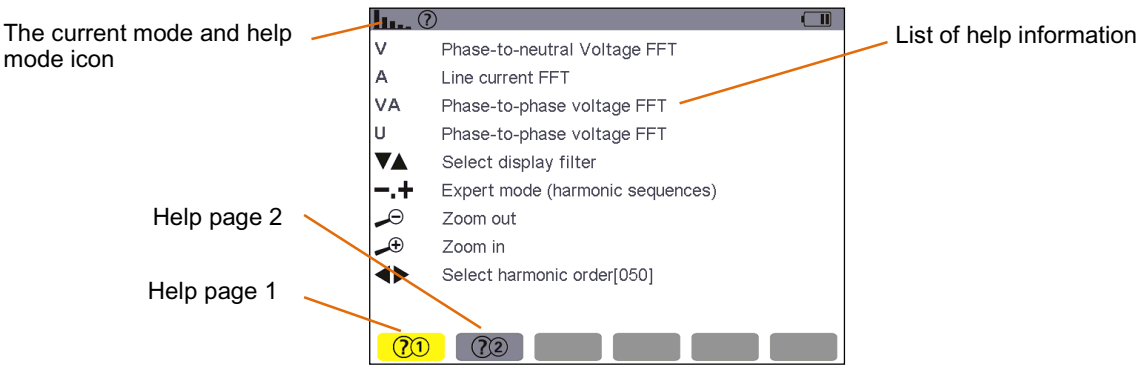


Figure 13-1: Example of the help page for the powers and energies mode, page 1

14. DATA UPLOADED TO THE COMPUTER

Download the data uploading software of corresponding model from official website. (https://www.uni-trend.com) Then connect the device to the PC using the USB cord supplied with the device, start the device, then open the data software to click on the computer's Power Quality Analyzer.exe. Wait for software to automatically search and connect the device. For directions for using the data export software, refer to its user manual.
Note: The transfer does not delete the data, just copy to the PC. In alarm/trend chart record/transient capture mode (pending or ongoing), PC cannot read the data.

15. GENERAL SPECIFICATIONS

15.1. Housing

Housing	Rigid shell overmoulded with a red thermo-adhesive elastomer.
Connectors	5 voltage measurement sockets.
	4 special current connectors.
	One connector for the specific mains power unit.
	One connector for the USB link.
	One connector for the SD memory card. This connector is located in the battery compartment on the back of the device.
Keys	Function, navigation, and mode. Can be used with gloves on.
Hand strap	Located on the side of the device, use to operation more convenient.
Stand	To hold the device in an inclined position.
Battery cover	To access the battery on the back of the Analyzer.
Dimensions	Overall: 240×170×68mm Screen: 640×480 pixels W×H: 118mm×90mm; Diagonal: 148mm
Weight	Host: 1600 g (with battery).

15.2. Power Supply

15.2.1. External mains power supply

Range for use	Input AC100V-240V, 50Hz/60Hz, Output DC12V, Maximum output current 3A.
Maximum input power	36VA

15.2.2. Battery supply

The device can be used without a connection to mains power. The battery also makes it possible to use the device during power outages.

Battery	Rechargeable lithium-ion battery pack 9.6V
Capacity	4500 mAh
Life	At least 500 charge-discharge cycles.
Charging current	approx. 0.6A
Charging time	approx. 8 hours
Service T°	[0 °C; 50 °C].
Charging T°	[10 °C; 35 °C].
Storage T°	Storage 30 days:[-20 °C ; 50 °C]
	Storage for 30 to 90 days: [-20 °C; 40 °C].
	Storage for 90 days to 1 year: [-20 °C; 30 °C].

15.2.3. Consumption

At 10% luminosity	410 mA

At 50% luminosity	490 mA
At 100% luminosity	590 mA

15.3. Range for use

15.3.1. Environmental conditions

15.3.1.1. Climatic conditions

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

	Temperature Range	Humidity Range
Reference environmental conditions	20°C~26°C	45%RH~75%RH
Application condition	0°C~50°C	10%RH~85%RH
Store condition（With battery）	-20°C~50°C	0%RH~90%RH
Store condition（Without battery）	-20°C~75°C	0%RH~90%RH

Caution: At temperatures above 40°C, the device must be powered by the battery alone OR by the mains power unit alone; use of the device with both the battery **AND** the mains power unit is **prohibited**.

15.3.1.2. Altitude

Use: [0 m; 2 000 m]

Storage: [0 m; 10 000 m]

15.3.2. Mechanical conditions

Under IEC 61010-1, the device is regarded as a **PORTABLE DEVICE (HAND-CARRIED).**

- Operating position: any position.
- Reference position in operation: on a horizontal plane, resting on its stand or lying flat.
- Rigidity (IEC 61010-1): force of 30 N applied to any part of the housing, the device being supported (at 40°C).
- Fall (IEC 61010-1): 1 m in presumed worst-case position; the requirement is no permanent mechanical damage and no functional degradation.
- Tightness: IP 50 as per NF EN 60529 A1 (IP2X electrical protection for the terminals).

15.3.3. EMC electromagnetic compatibility

15.3.3.1. Immunity as per IEC 61326:1-2006

- Immunity to electrostatic discharges (as per IEC 61000-4-2)

Level 1: Severity: 4 kV in contact

standard: Standard A

Level 2: Severity: 8 kV in air

standard: Standard A

- Immunity to radiated fields (as per IEC 61000-4-3 and IEC 61000-4-8)

Severity: 10V.m-1

Standard: standard B

- Immunity to rapid transients (IEC 61000-4-4)

Severity: 2 kV on voltage inputs and power supply

1 kV on current input

Standard: standard A

- Immunity to electric shocks (as per IEC 61000-4-5)

Severity: 2 kV on voltage inputs in differential mode

1 kV on voltage inputs in common mode

Standard: standard A

- Conducted RF interference (as per IEC 61000-4-6)

Severity: 3 V on voltage inputs and power supply

Standard: standard A

- Voltage interruption (as per IEC 61000-4-11)

Severity: 100% loss over one period of the power supply

Standard: standard A

15.3.3.2. Emissions as per IEC 61326:1-2006

- Class A equipment.

15.4. User safety

- Application of safety rules as per IEC standard 61010-1 (protective impedances on voltage inputs).
- Pollution type 2.

- Double insulation on I/O with respect to earth (⧈ symbol).
- Double insulation between the voltage inputs and power supply and the other I/O (⧈ symbol).
- Indoor use.

16. FUNCTIONAL CHARACTERISTICS

16.1. Reference conditions

This table indicates the reference conditions of the quantities to be used by default in the characteristics.

Ambient temperature	(23±2)°C
Humidity (relative humidity	40%~ 60%
Atmospheric pressure	[860hPa~ 1060hPa]
Phase-to-neutral voltage	[(50±1%) Vrms; (500±1%) Vrms] without DC (< 0.5 %)
Frequency of electrical network	50Hz±0.1Hz, 60Hz±0.1Hz
Phase shift	0° (active power), 90° (reactive power)
Harmonics	<0.1%
Voltage unbalance	<10%
Voltage ratio	1
Current ratio	1
Power supply	Battery only
Electric field	<1V/m
Magnetic field	<40A/m

16.2. Electrical characteristics

16.2.1. Voltage input characteristics

0 Vrms to 1000 Vrms AC+DC phase-to-neutral and neutral-to-earth.
0 Vrms to 2000 Vrms AC+DC phase-to-phase. (On condition of compliance with 1000 Vrms with respect to earth in CAT III).

16.2.2. Current input range

008B current clamp: 10mA~ 10A.
040B current clamp: 0.10A~ 100A.
068B current clamp: 1.0A~ 1000A.
Optional current transformer**:** device input current 1mA~ 500mA.

16.2.3. Characteristics of the device alone (excluding the current sensor)

Respectively introduce the following data (on the basic of base conditions and the ideal current sensors, perfectly linear, no phase shift).

Measurement	Range	Display resolution	The maximum error in the range of the reference
Frequency	40Hz~ 70Hz	0.01Hz	±(0.03)Hz
True RMS phase-to-neutral voltage	1.0V~ 1000V	Min resolution 0.1V	±(0.5%+5dgt)
True RMS phase-to phase voltage	1.0V~ 2000V	Min resolution 0.1V	±(0.5%+5dgt)
DC voltage	1.0V~ 1000V	Min resolution 0.1V	±(1.0%+5dgt)
True RMS current	10mA~ 1000A	Min resolution 1mA	±(0.5%+5dgt)
Peak of phase-to-neutral voltage	1.0V~ 1414V	Min resolution 0.1V	±(1.0%+5dgt)
Peak of phase-to-phase voltage	1.0V~ 2828V	Min resolution 0.1V	±(1.0%+5dgt)
Current peak	10mA~ 1414A	Min resolution 1mA	±(1.0%+5dgt)
Peak factor	1.00~ 3.99	0.01	±(1%+2dgt)
	4.00~ 9.99	0.01	±(5%+2dgt)

Active power	0.000W~ 9999.9kW	Min resolution 0.001W	±(1%+3dgt) Cos 0.8
			±(1.5%+10dgt) 0.2 Cos <0.8
Reactive power, inductive or capacitive	0.000VAR~ 9999.9kVAR	Min resolution 0.001VAR	±(1%+3dgt) Sin 0.5
			±(1.5%+10dgt) 0.2 Sin <0.5
Apparent power	0.000VA~ 9999.9kVA	Min resolution 0.001VA	±(1%+3dgt)
Power factor	-1.000~ 1.000	0.001	±(1.5%+3dgt) Cos 0.5
			±(1.5%+10dgt) 0.2 Cos <0.5
Active energy	0.000Wh~ 9999.9MWh	Min resolution 0.001Wh	±(1%+3dgt) Cos 0.8
			±(1.5%+10dgt) 0.2 Cos <0.8
Reactive energy, inductive or capacitive	0.000VARh~ 9999.9MVARh	Min resolution 0.001VARh	±(1%+3dgt) Sin 0.5
			±(1.5%+10dgt) 0.2 Sin <0.5
Apparent energy	0.000VAh~ 9999.9MVAh	Min resolution 0.001VAh	±(1%+3dgt)
Phase angle	-179°~ 180°	1°	±(2°)
Tanφ (VA≥50VA)	-32.76~ 32.76	Min resolution 0.001	:±(1°)
Phase shift of power factor (DPF)	-1.000~ 1.000	0.001	:±(1°)
Harmonic ratio (order 1 to 50) (Vrms>50V)	0.0%~ 99.9%	0.1%	±(1%+5dgt)
Harmonic angle (Vrms>50V)	-179°~ 180°	1°	±(3°) harmonics of order 1 to 25
			±(10°) harmonics of order 26 to 50
Total harmonic ratio (THD or THD-F)≤50	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 phases unbalance	0.0%~ 100%	0.1%	± (1%)

16.2.4. Current sensor characteristics (after linearization)

Sensor errors are offset by a typical correction inside the device. This typical correction, applied to the phase and amplitude, depends on the type of sensor connected (detected automatically) and the gain in the current acquisition channel used.

Type of current sensor	True RMS current	Max error of true RMS current	Max error of phase angle φ
008B current clamp	10mA~ 99mA	±(1%+3dgt)	±(1.5°),Arms 20mA
	100mA~ 10.0A	±(1%+3dgt)	±(1°)
040B current clamp	0.10A~ 0.99A	±(1%+3dgt)	±(1.5°)
	1.00A~ 100A	±(1%+3dgt)	±(1°)
068B current clamp	1.0A~ 9.9A	±(2%+3dgt)	±(3°)
	10.0A~ 1000A	±(2%+3dgt)	±(2°)
300F flexible current sensor	10A～99A	±(1%+3dgt)	±(3°)
	100A～6000A	±(1%+3dgt)	±(2°)

17. APPENDICES

17.1. Mathematic Formulae

17.1.1. Network frequency and sampling

Sampling is controlled by (locked to) the network frequency so as to deliver 256 samples per cycle from 40 Hz to 70 Hz. This locking is essential for the calculations of reactive power, unbalance, and harmonic ratio and angles.

The frequency is measured by analyzing ten consecutive positive-going zero crossings in the first voltage channel (V1) or first current channel (I1) after digital low-pass filtering and digital suppression of the DC component.

The time of the zero crossing is determined precisely by linear interpolation between two samples to achieve resolution better than 0.002%.

The signals are acquired using a 16-bit converter and (for current acquisition) dynamic gain switches.

17.2. Hysteresis

Hysteresis is a screening principle that is often used after detection of a threshold stage in Alarm mode (See § 5.10) and in Inrush current mode (see § 6.3). A correct hysteresis setting avoids repeated changes of state when the measurement oscillates about the threshold.

17.2.1. Surge detection

With a hysteresis of 2%, for example, the return level for surge detection is equal to (100% - 2%) or 98% of the reference voltage threshold.

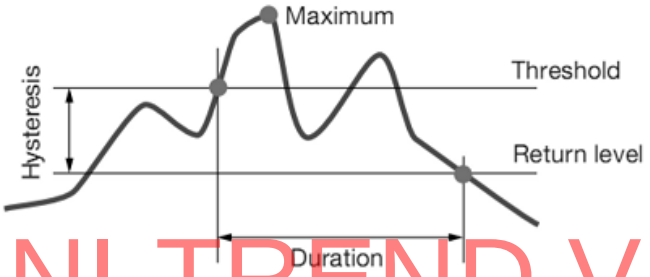


Figure 17-1: An example of return level for surge detection

17.2.2. Undervoltage or blackout detection

With a hysteresis of 2%, for example, the return level for undervoltage detection is equal to (100% + 2%) or 102% of the reference voltage threshold.

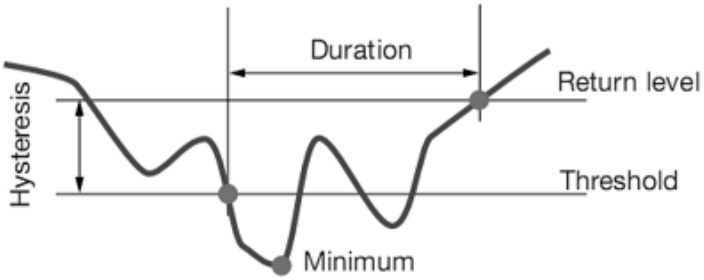


Figure 17-2: an example of return level for undervoltage detection

17.3. Four-quadrant Diagram

This diagram is used for power and energy measurements W .

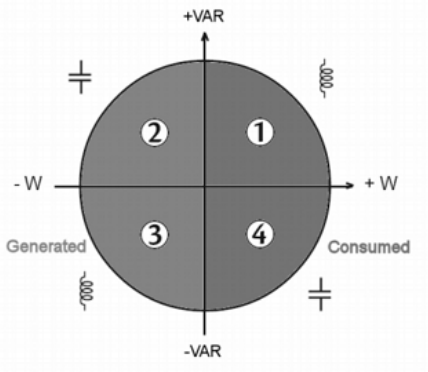


Figure 17-3: Four-quadrant diagram for power and energy

17.4. Mechanism For Triggering Transient Captures

The sampling rate is a constant 256 samples per cycle. When a transient capture is started, each sample is compared to the sample from the preceding cycle. The preceding cycle defines the mid-point of the trigger envelope and is used as reference. As soon as a sample is outside the envelope, the triggering event occurs; the representation of the transient is then captured by the device. The cycle preceding the event and the three following cycles are saved to memory.

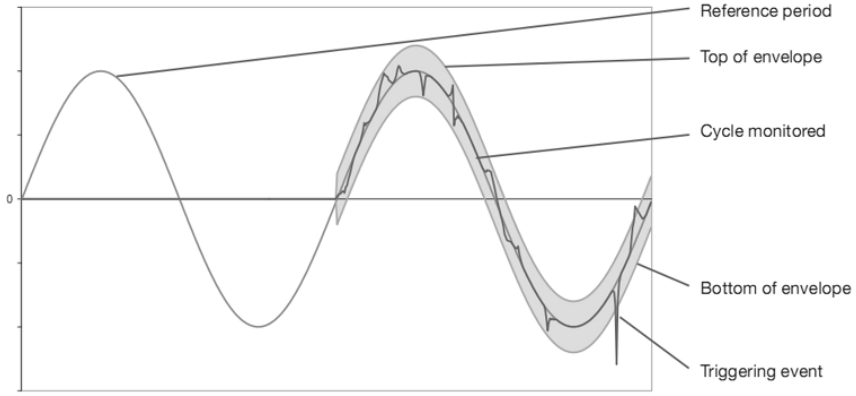


Figure 17-4: A graphic representation of the transient capture triggering mechanism

17.5. Capture Conditions In Inrush Current Mode

Reminder: The capture depends on a triggering (start) event and a stop event. If a capture ends with a stop event or if the recording memory of the device is full, the capture stops automatically.

The capture stop threshold is calculated as follows:

[Stop threshold [A]] = [Start threshold [A]] × (100 – [stop hysteresis [%]]) ÷ 100

Here are the conditions for triggering and stopping captures:

Triggering channel	Triggering and stop conditions
A1	Triggering condition ⇔ [A1 halfcycle RMS value] > [Triggering threshold] Stop condition ⇔ [A1 halfcycle RMS value] < [Stop threshold]
A2	Triggering condition ⇔ [A2 halfcycle RMS value] > [Triggering threshold] Stop condition ⇔ [A2 halfcycle RMS value] < [Stop threshold]
A3	Triggering condition ⇔ [A3 halfcycle RMS value] > [Triggering threshold] Stop condition ⇔ [A3 halfcycle RMS value] < [Stop threshold]
3A	Triggering condition ⇔ [[the half-cycle RMS value of one current channel]> [Triggering threshold] Stop condition ⇔ [the halfcycle RMS values of all current channels] < [Stop threshold]

18. MAINTENANCE

18.1. Important Recommendation

For maintenance, use only the spare parts specified. The manufacturer cannot be held liable for any accident that occurs following a repair not performed by its customer service department or by an approved repairer.

18.2. Recharging The Battery

The battery charge is managed by the device when connected to the AC network via the mains power unit supplied.

★ For safety reasons and to ensure the correct operation of the charger, the storage battery must be replaced with the power off.

★ Do not throw the battery into a fire.

★ Do not expose the battery to a temperature in excess of 75°C.

★ Do not short-circuit the terminals of the battery.

★ When the battery is fully recharged, please remove the power adapter (if external power supply is not used).

18.3. Replacing The Battery

⚠For safety reasons, advice that replace the battery only with the original model

To replace the battery, proceed as follows:

★ To eliminate all risk of electric shock, disconnect the power supply cord and connected devices.

★ Turn the device over.

★ Use a cross screwdriver to unscrew the two quarter-turn screws on the back of the housing. Then open the battery cover.

★ Gently remove the old battery, replace a new original battery (To avoid damaging the battery connection, do

not pull on the wires).
★ Put the battery compartment cover back in place and screw the 2 quarter-turn screws back in.
★ Reboot the device to confirm.
Note: If the battery is disconnected, it must then be fully recharged, even if it is not replaced, so that the device will know the battery charge condition (this information is lost when the battery is disconnected).

Data Analysis Software
User Manual

CONTENTS

1. SUMMARY

The software, Power Analyzer Transfer Data View, is based on Windows system and matches with the device. This Data analysis software is used for viewing waveforms, harmonics, power energies, and can be exported to the type of real-time test data file. Real-time test data file is saved to your computer, so when you need to re-import into the analysis software to view; the device can be used to save the trend recording, alarm recording, transient recording, the inrush current recording, snapshots uploaded to the computer and display, and can be stored in the form of long-term data files to retain power for when you need to re-import into the analysis software to view.

Note: When an alarm campaign is initiated or a search for transients, an inrush current capture, or a trend recording is pending or in progress, the device will not respond to the data analysis software. You can upload the data after the capture completed. When the software connects with the device successfully, the device's mode should be through the data software to switch instead of pressing the keys of device directly.

The functions as follows:

- Monitoring test data and waveforms, monitor waveforms, harmonics and power energies in real time.
- Upload and view historical monitoring data.
- To zoom in, zoom out, move left and right, sorting data and waveforms.
- Export data files (*.pqaf).
- Export excel data report.
- Save pictures on the current screen.
- Import the previously saved data files (*.pqaf).

2. INSTALLATION

2.1. Software Installation

Download the "Power Quality Analyzer.exe" from the official website of Uni-Trend.
Then install it according to the software instructions.
If you fail to install the software, please contact the local seller or distributor.

3. SOFTWARE START-UP

3.1.Start-up steps

Connect the device to the computer using the USB cord, then switch the device on, click the desktop shortcut: Power Quality Analyser.exe. to start-up the software. After the software start-up, it will detect automatically the computer and connect with the computer. In general, it needs about 5 seconds to upload all the test data, and then enters the Waveform mode by default.

The following information is displayed:

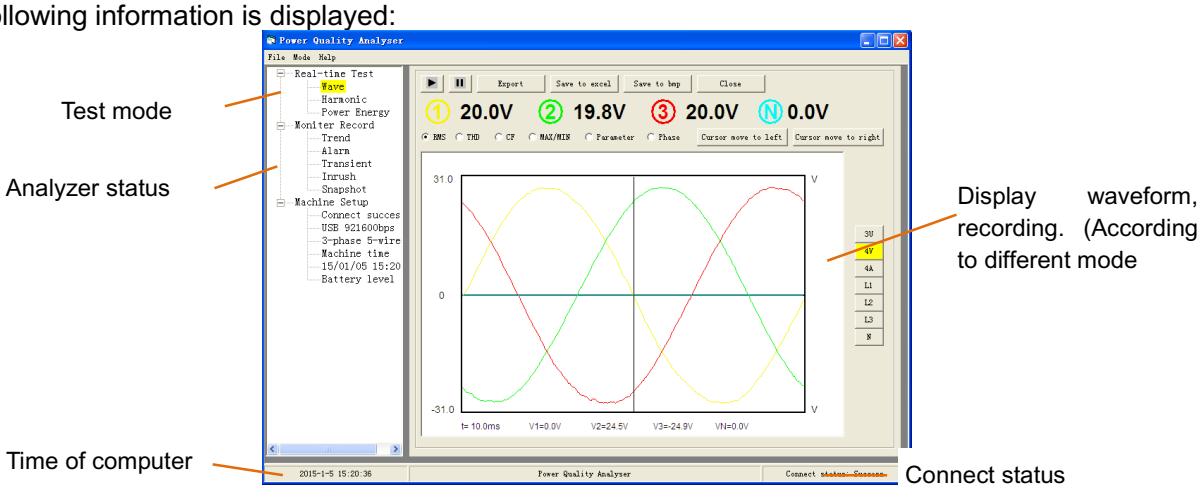


Figure 3-1: the software normal start-up and connect display screen

As shown in Figure 3-1, the test mode have two parts: real-time test and monitor record. The real-time mode can be selected waveform mode, harmonic mode and power energy mode. The monitor record can be selected trend recordings, alarms, transient recordings, inrush currents, snapshots. Yellow highlight indicates the current mode.

4. REAL-TIME DATA

Real-time data is used to display the device's test data and waveforms in real time, including waveform, harmonic, and power energy mode. The software reads the real data from the device every 1 second, and

refreshes the display. The user can click on the icon to suspend update to observe the waveform, click on the icon to continue refreshing the waveforms.

4.1. Waveform mode

Click the Real-time Test/Wave to enter into the Waveform mode, and to display the test waveforms and data. The following information is displayed:

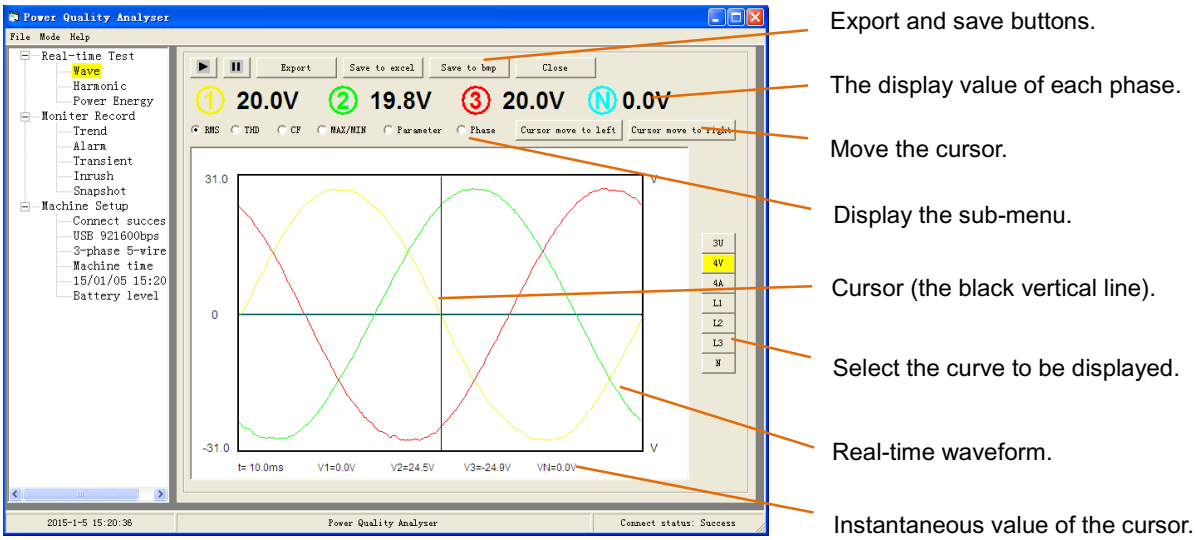


Figure 4-1: Display the waveform in Real-time Test Mode

■ Export the data files: export the waveform data, the current curve waveform and the current status of the device information, and saved as the extension ***.pqaf***. You can re-import when needed, and the display as the real-time monitoring, cannot be switched only in the import mode. (See § 6).

■ Save to excel: export the waveform data, the current curve waveform and the current status of the device information, and saved in the form of excel list.

■ Save to bmp: saved the current display screen in the form of bmp.

■ Display sub-menu: select to display RMS, THD, CF, maximum, minimum, parameter list and phasor diagram.

■ Select the curve to be displayed. Click the buttons (3U, 4V, 4A, L1, L2, L3, N) to select the displayed curve.

Note: in these three modes, the test mode of device will vary with the test mode of software to switch, that is, the software and the device are in the same mode.

4.2. Harmonic Mode

Click the Real-time Test/Harmonic to enter into the Harmonic mode, display of the harmonic bar charts and the relevant data.

The following information is displayed:

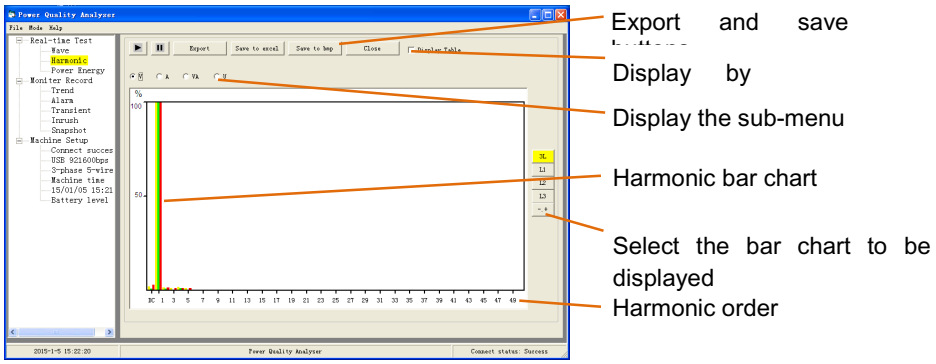


Figure 4-2: display the harmonic in Real-time Test

■ Display list: check: display of the list of harmonic data each phase in the form of table;
Uncheck: display of the list of harmonic data each phase in the form of bar chart.

■ Display sum-menu: to select display of the harmonic bar chart of V, A, VA, U.

■ Select the bar chart to be displayed: click the buttons (3L, L1, L2, L3, -,+ expert mode) to switch the diagrams to be displayed.

4.3. Power Energy Mode

Click the Real-time Test/Power Energy to enter into the Power Energy mode, display of the power and the

metering energy.
The following information is displayed:

■ Start calculate: press the *Start calculate* button, the energy starts to calculate, and displays the start time in the lower left corner of the window.

■ Stop calculate: after starting calculation, press the *Stop calculate* button to stop calculate the energy, and displays the stop time in the lower right of the window.

■ Reset of energy metering: after stop calculation, press the *Clear* button to reset the energy values in the tables.

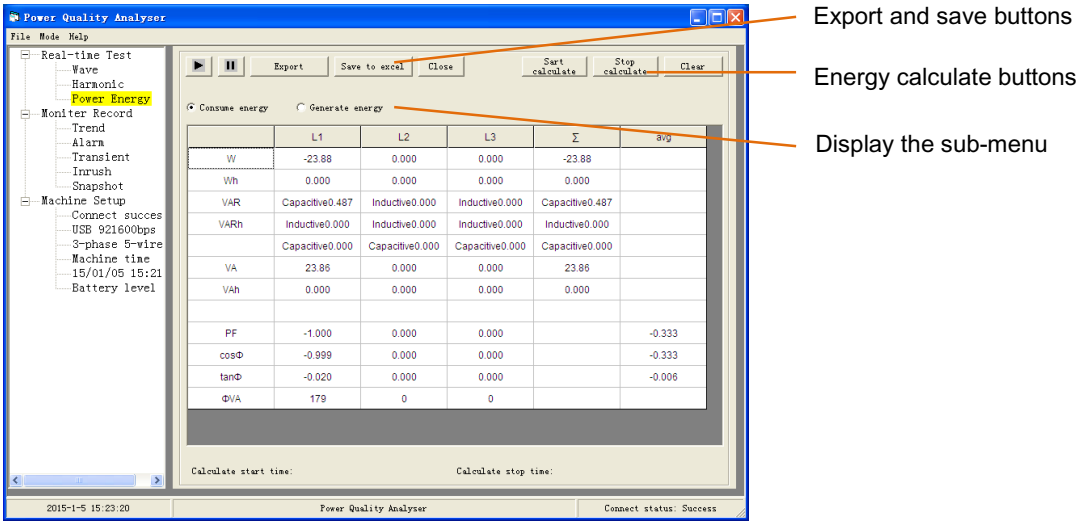


Figure 4-3: Displaying power energy in real-time test

5. MONITER RECORD

Monitor record including trend recordings, alarms, transient recordings, inrush currents, snapshots. It is used to upload the data which is saved in the device to the computer for view and export.

5.1. Trend Recording

Click the *Monitor Record/Trend* to upload the recording and the number of the records, and displays in tables.
The following information is displayed:

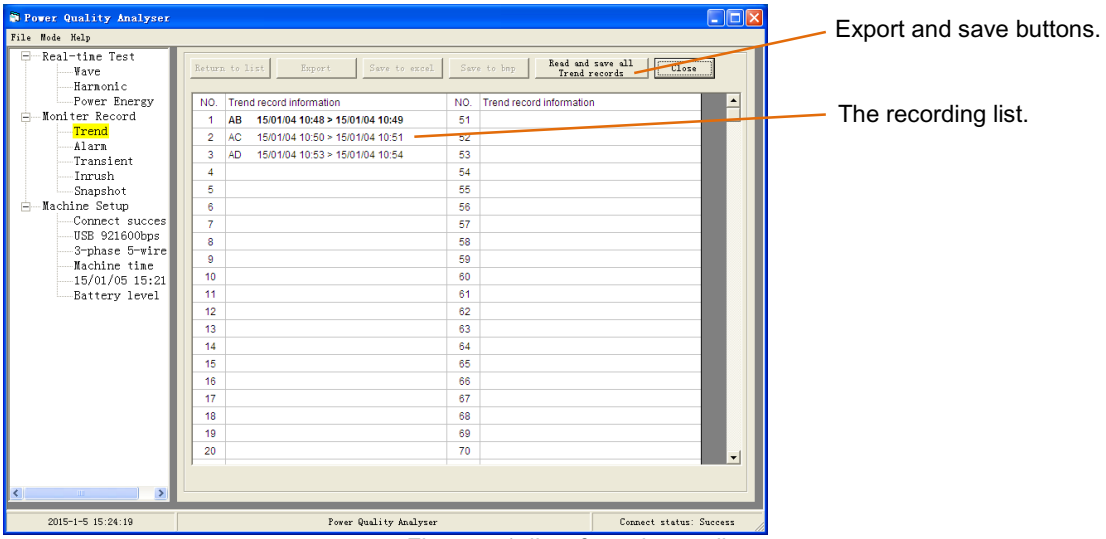
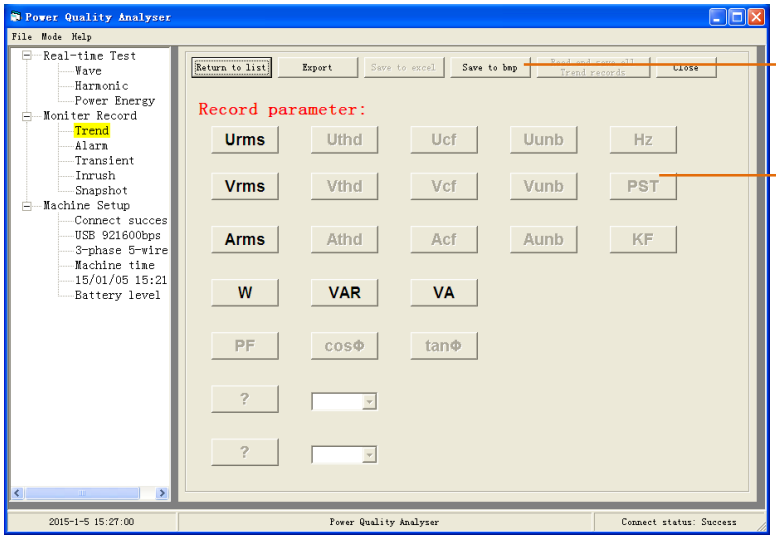


Figure 5-1: list of trend recording

■ Read and save all the trend charts: readout all the trend recording of the device and save to the default address: C:\PowerQuality\trend.

In the list of trend recording, the field where the mouse is bolded, click the left mouse button, upload and display the selected trend recordings.
The following information is displayed:



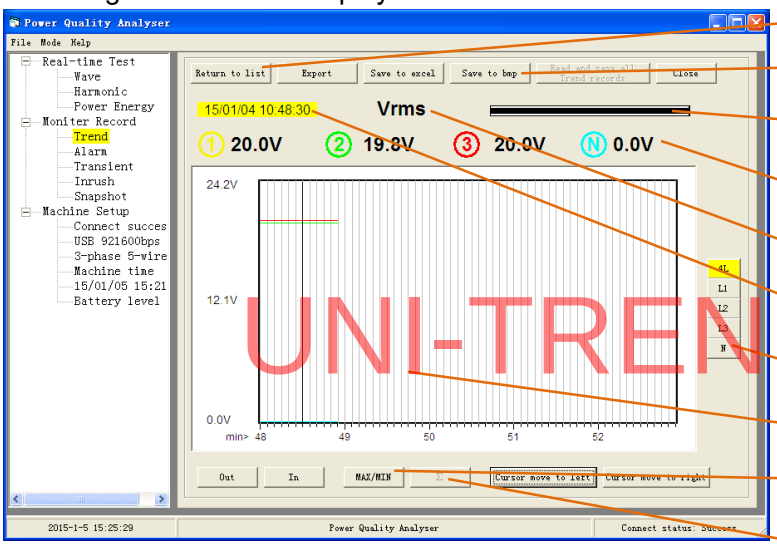
Export and save buttons.

Parameter list of the trend recording.

Figure 5-2: Parameter list of the trend recording

The parameter list if the parameters that are selected and recorded in the trend mode. All parameters displayed in the figure. Black buttons indicate the selected parameters; gray buttons indicate the unselected parameters. Click the corresponding button to enter the trend curve waveform.

The following information is displayed:



Return to the trend recording list.

Export and save buttons.

Location of the zone displayed in the record.

Value of the cursor.

Current parameter name.

Date and time of the cursor.

Select the curve to be displayed.

Trend curve chart.

The activated MAX-AVG-MIN mode.

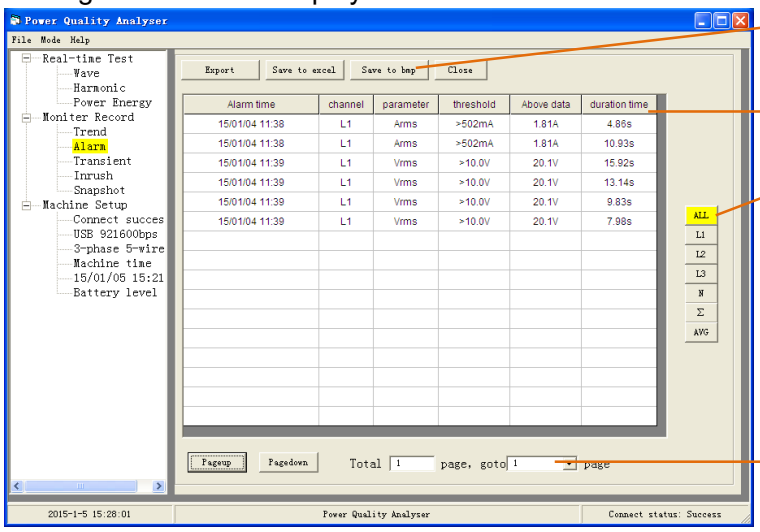
The button of start metering energy (when the selected parameter is W, VAR, VA).

Figure 5-3: Curve of the trend recording

5.2. Alarm Recordings

Click the Monitor Record/Alarm to upload the alarm log and the number of the records, and displays in table.

The following information is displayed:



Export and save buttons.

The list of alarm log.

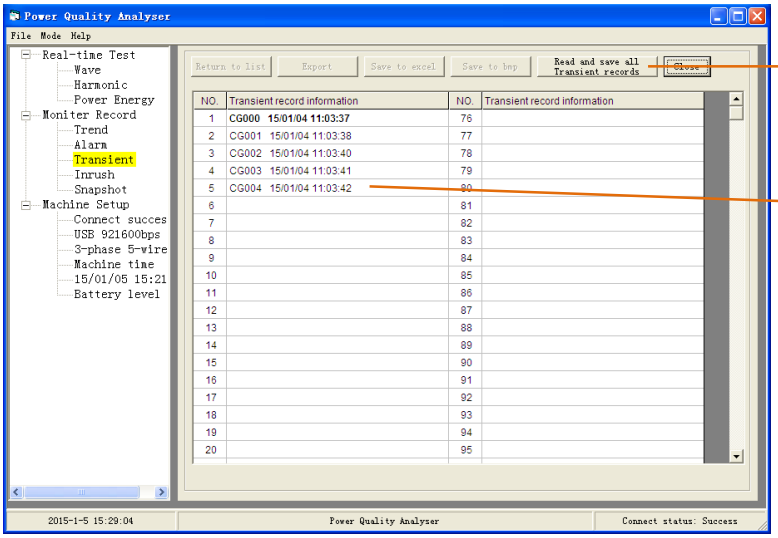
Press the trigger alarm channel to display the alarm log by classification.

Turn the page

Figure 5-4: Alarm list screen

5.3. Transient capture recording

Click the Monitor Record/Transient to upload the recorded transients and the number of the records, and displays in table.
The following information is displayed:

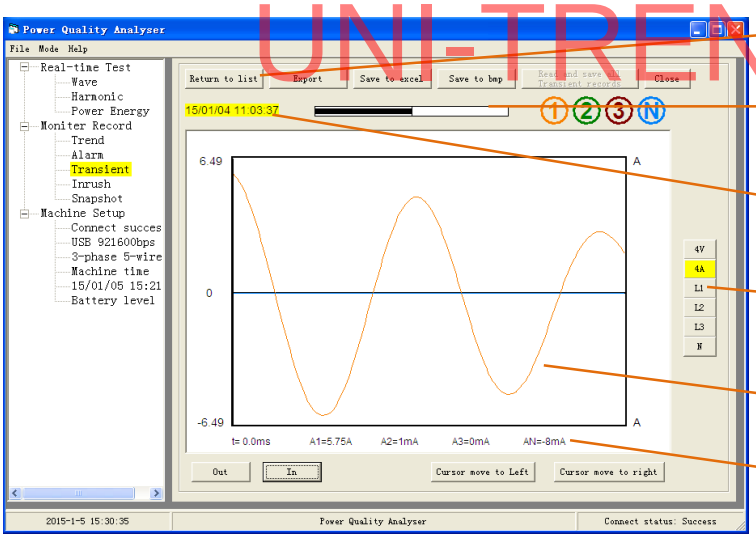


Read all the records and save to the default address.

The recording list.

Figure 5-5: Instantaneous recordings

■ Read and save all the transient recordings: readout all the transient recordings of the device and save to the default address: C:\PowerQuality\ tran.
In the list of transient recording, the field where the mouse is bolded, click the left mouse button, upload and display the selected transient recordings. The following information is displayed:



Return to the transient recording list.

Location of the zone displayed in the record.

Date and time of the cursor.

Select the curve to be displayed.

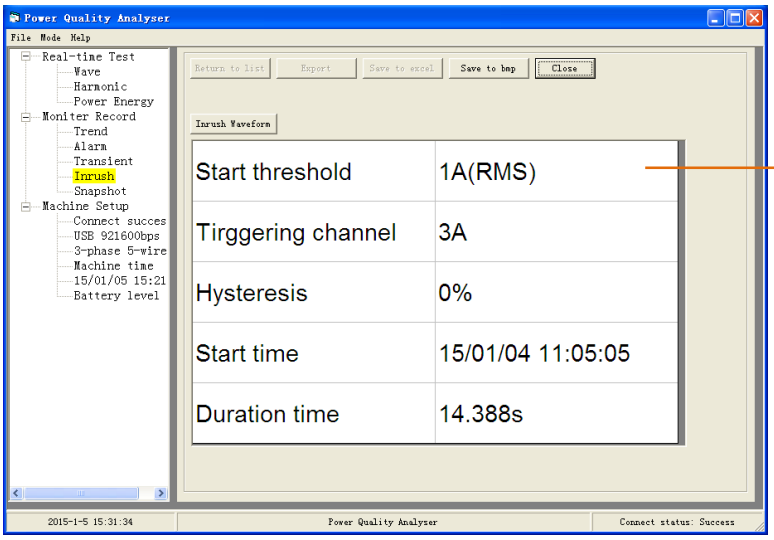
Transient waveform.

Instantaneous value of the cursor.

Figure 5-6 transient waveform display

5.4. Inrush Current Capture Recording

Click the Monitor Record/Inrush to upload the inrush current recording, and displays in table.
The following information is displayed:

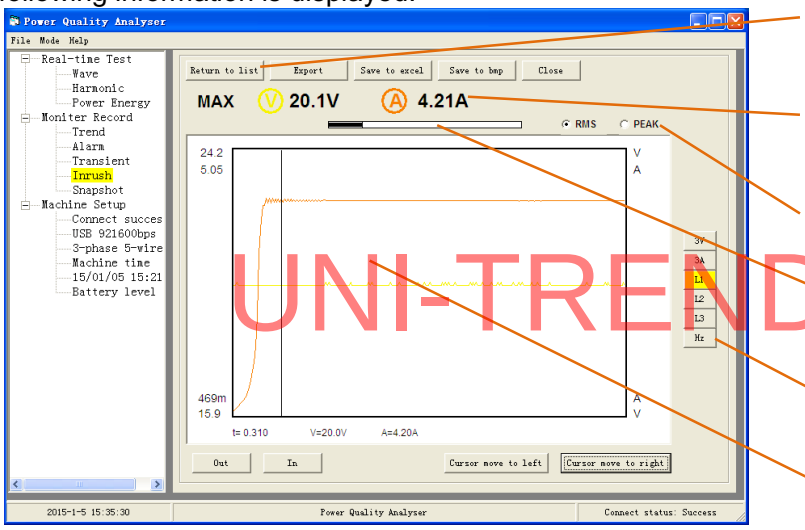


The inrush current recording list.

Figure 5-7: Inrush current recordings

In the inrush current recording list, click the *Inrush Waveform* button to upload the inrush current recordings, when the upload is complete, the inrush current waveform will be displayed.

The following information is displayed:



Return to the inrush current recording list.

The maximum RMS value (over the entire capture).

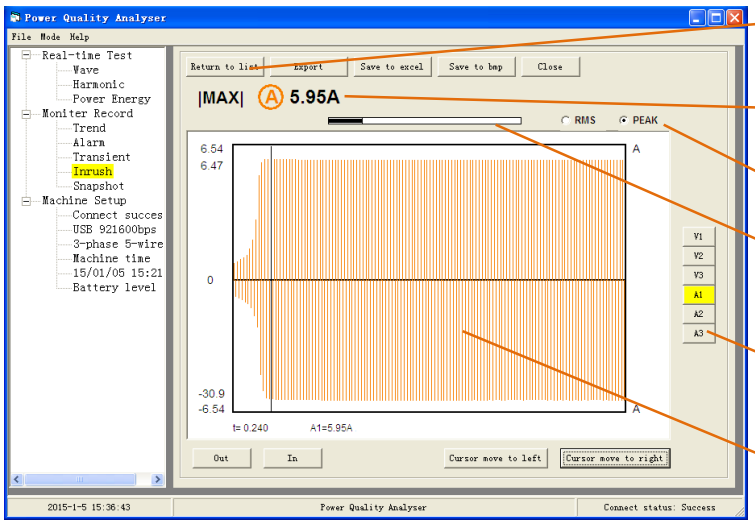
Switch RMS and PEAK.

Location of the zone displayed in the record.

Select the curve to be displayed

RMS curve in the half-cycle.

Figure 5-8: RMS of inrush current



Return to the inrush current recording list.

The maximum PEAK value (over the entire capture).

Switch RMS and PEAK.

Location of the zone displayed in the record.

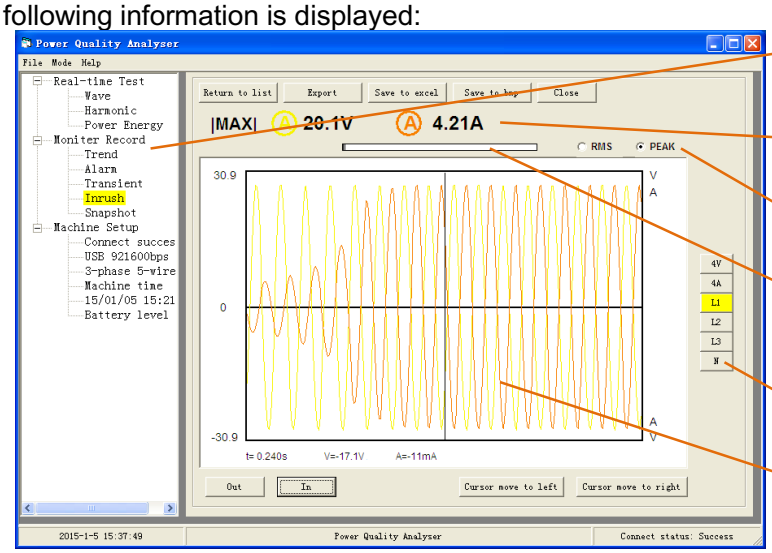
Select the curve to be displayed.

PEAK envelope.

Figure 5-9: PEAK of inrush current

When the PEAK envelope of the inrush current is displayed, click the *In* button to display the recorded waveform curves of the inrush current.

The following information is displayed:



Return to the inrush current recording list.

The maximum RMS value (over the entire capture).

Switch RMS and PEAK.

Location of the zone displayed in the record.

Select the curve to be displayed

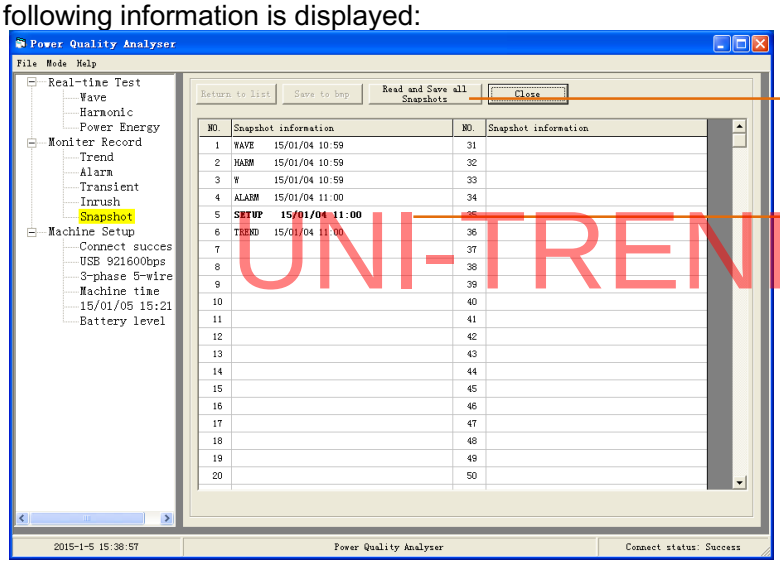
Waveform.

Figure 5-10: Waveform of inrush current

5.5. Snapshots

Click the Monitor Record/Snapshot to upload the snapshots and the number of the snapshots, and displays in table.

The following information is displayed:



Read all the records and save to the default address.

The recording list.

Figure 5-11: Snapshots table

■ Read and save all the snapshots: readout all the snapshots of the device and save to the default address: C:\PowerQuality\ photo.

In the list of snapshot, the field where the mouse is bolded, click the left mouse button, upload and display the selected snapshots.

The following information is displayed:

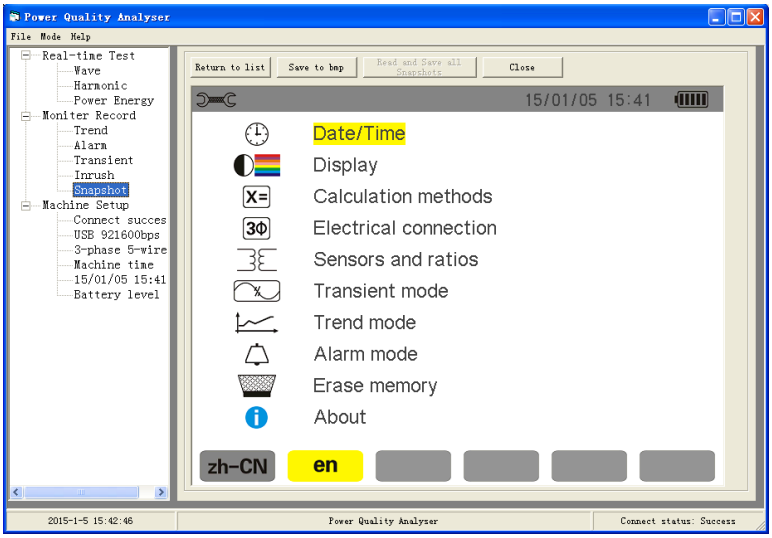


Figure 5-12: uploaded snapshots displayed screen

6. IMPORT DATA FILE

In the screen of Real-time Test and Monitor Record, to export the file which extension is **.pqaf**, press the Export button. The file saved the current real-time data or monitor records. The data can be re-imported to the software to display in need. Proceed as follows:
Disconnect the USB cord or turn the device off, then close the data analysis software, then click the Power Quality Analyser.exe to restart the software.
The following information is displayed:

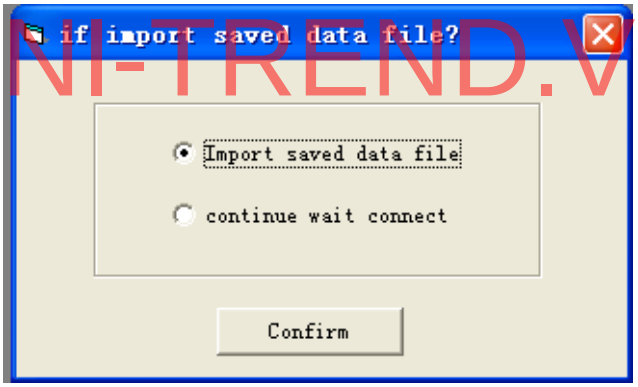


Figure 6-1: open the software without connecting to the USB

Select *Import saved data file,* press *Confirm* to enter the *Import data file* mode. In this status, it displays neither real-time data waveform nor device's status.
Import method: click the menu bar: *File\Import*, select the corresponding file which extension is ***.pqaf***, then the real-time data and monitor records are displayed as §4 and §5. In this status, the display screen accords to the import data mode, and the mode cannot be switched.

7. Instrument CALIBRATION TIME

In the normal, the device and computer connect successfully with the USB, if there is deviation between the device time and computer time, you can calibrate the device time to be consistent with the computer time. Click the menu: *File\ calibrate Instrument time*. Displayed as the following figure (the red block):

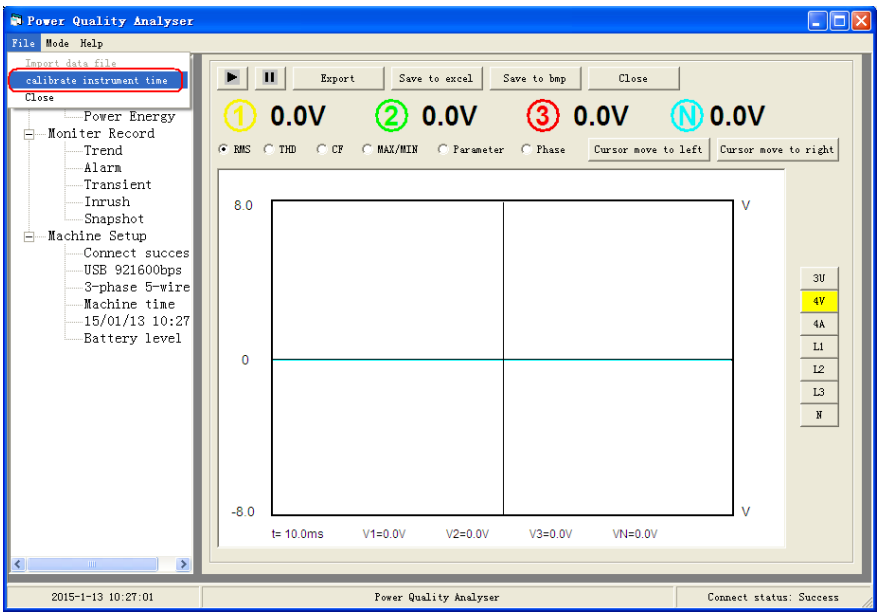


Figure 7-1: Analyzer calibration time

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 company reserves the right to modify the contents of the user manual.
The contents in the User Manual are subject to change without further notice.