User's Guide

SA2300

Three Phase Power Analyzer

Suin Instruments Co., Ltd **05/2023**

Introduction

SA2300 three phase power analyzer adopts ARM processor hardware platform and embedded operation system, which can calculate a large number of electrical parameters and display them quickly. The device offers extensive and powerful measurements functions to check power distribution system, so it can detect quality of power grid and electrical characteristics rapidly and conveniently. The analyzer has color LCD touch screen, and easy-to-use keyboard

Main features:

- Waveform real-time display(4 voltages and 4 currents)
- Half cycle RMS measurement (voltage and current)
- Both key and touch screen operations are supported
- Optional variety of current clamps
- Measurement of harmonics can be up to 51 times.
- Vector, Trend, Bar Graph and events table display
- Active power, reactive power, apparent power and energy, shift power factor and true power factor
- Three-phase unbalance (voltage and current)
- Detection and record Dips& Swells
- Data storage and screenshots (can be replayed or export to a PC)
- Through the LAN interface the Analyzer can keep real-time remote communication with PC, operate the Analyzer and download measurement data.
- Built-in 32GB memory card.

The Analyzer and its accessories

- SA2300 three phase power analyzer 1
- 2-meter-long Voltage Test Leads (with 4mm caliber banana plug) 5
- Alligator Clips 5
- Power Adapter 1
- Power Cord 1
- Soft Carry Bag 1
- Hang Strap 1

Options

AC Current Transformer

- ST08 (5A)
- CTC0080 (50A)
- CTC0130 (100A)

AC Rogowski Coil

- SY-1500A (1500A)
- PY-3000A (3000A)
- SY-6000A (6000A)

General Safety Information

The Analyzer is designed and produced according to IEC61010-1 strictly, and complies with CAT III 600V and pollution degree II. Learn about below safety precautions to avoid personal injury, and damage to the Analyzer or any other devices connected to it.

To avoid electrical shock or fire：

- Review the instructions of the manual before use of the Analyzer and its accessories.
- Avoid working alone.
- Do not operate the Analyzer around explosive gas, vapor or moist environment.
- Use the Analyzer as specified, or the protection provided by the Analyzer might be impaired.
- Use only insulated current clamps, voltage test leads and power adaptor as supplied with the Analyzer, or indicated as suitable for the Analyzer.
- Before use, inspect the Analyzer, current clamps, voltage test leads, power adaptor and accessories for mechanical damage and replace when damaged. Look for cracks or missing plastic. Pay special attention to the insulation surrounding the connectors.
- Verify operation of the Analyzer by measuring known voltage.
- Remove all current clamps, voltage test leads and accessories that are not in use.
- Always connect the power adapter first to the AC outlet before connecting it to the Analyzer.
- Do not touch high voltage: voltage>AC RMS 30V or DC 60V.
- Do not apply input voltage above the rating of the Analyzer.
- Only use correct measurement standard category (CAT), voltage test leads, Alligator Clips, current clamps and power adapter for measurement.
- Do not apply voltages in excess of the marked ratings of the voltage test leads or current clamps.
- Comply with local and national safety standard. In dangerous environment where the live wires are exposed, personal protection equipment such as approved rubber gloves, facial protection and flame-retardant clothing must be used to prevent electric shock and arc discharge damage.
- Pay special attention when connecting or removing flexible current clamps: power down the device being tested or put on suitable protection suit.
- Do not insert metal objects into ports.

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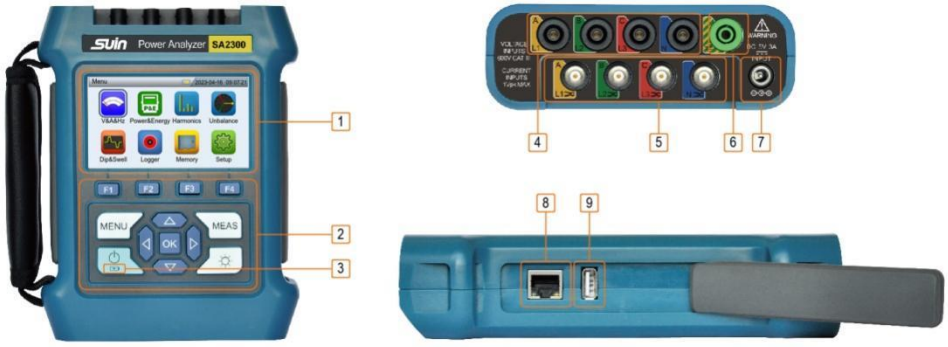
Note: The information in this document may be slightly modified without further notice. This document may contain technical inaccuracies or typographical errors. This document only guides instrument using, and we will don't guarantee for any form of it, including, but not limited to, the implied guarantees of merchantability and fitness for a specific purpose.

Chapter 1 Getting started

User could learn the basic operation of the device through this chapter.

1.1 Overview of the Analyzer



①: display area (touch screen)
②: keyboard area
③: charge indicator
④: voltage input terminal
⑤: input terminal of current clamp
⑥: GND input terminal
⑦: power adapter interface
⑧: LAN interface
⑨: USB-Host interface

1.2 Description of Key Functions and Indicator Icon

F1 – F4	**Function key: specific function based on screen menu bar**
MENU	**Main menu shortcut key: enter into main menu interface quickly**
	1. Power on/ off function **2、: Charge indicator: red: still in charging** **green: charge completely**
OK	**Direction key: can move cursor** **OK key: press this key to confirm current select**
MEAS	**Short press: Fast switching between current/voltage/frequency, power & energy, harmonics and unbalance** **Long press: to realize screenshot**
	Brightness adjustment: Press this button repeatedly to adjust the lightness of the screen

In below text, use【*】to represent corresponding key.

Icon in state indicator bar

	Battery capacity indicator, green indicates enough, red indicates low
	Charge indicator
	Charge Complete
	USB flash disk has connected
	Wired network has connected
	Logger is running

1.3 Battery charging and replacement

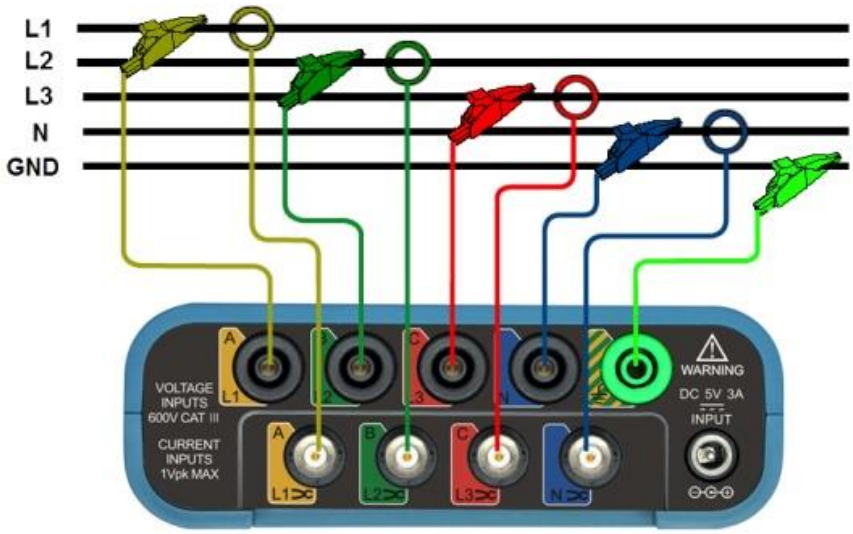
At delivery, the built in chargeable battery may be empty and it is recommend to charge it before use. A full charge for the first time takes about 6 hours, when the charging indicator color changing from red to green, it reminds user the battery is fully charged. The Analyzer automatically cuts off charging when the battery is fully charged. Before use, check that the adapter voltage and frequency range match the local line power range. To prevent decrease of batter capacity charge it at least once every three months.

If the battery batter replacement is needed, please power off device and disconnect the power adaptor from device, then open the battery cover in rear panel of device through unscrewing the four screws as below picture shown. 2pcs 18650 Li-ion are configured standardly, please pay attention to positive and negative as direction marker indicated in battery cover to ensure the batteries are installed correctly.

The protection circuit of device is started after replacing the battery and please don't turn on device at this time. Firstly connect the adapter to device, when the charging indicator turns to red, the circuit protection is lifting. Then user can remove the adapter to let device work by battery independently.

Attention: Make sure the batteries are installed correctly as the positive and negative direction marker indicated in the battery cover.

1.4 Input Connections



The Analyzer has 4 BNC-inputs for current clamps and 5 banana-inputs for voltage test leads. For a 3-phase system, make the connections as above picture show.

First put the current clamps around the conductors of phase **L1/A, L2/B, L3/C a**nd **N.**

The clamps are marked with an arrow indicating the correct signal polarity.

Next make the voltage connections: start with **GND** and then succession **N, L1/A, L2/B** and **L3/C**.

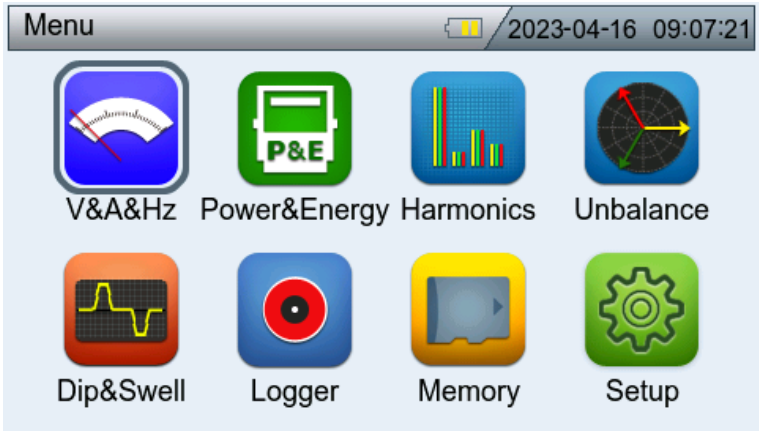
For single phase measurements, use voltage input **L1/A, GND** and **N** (neutral line) or current input L1/A .

Voltage phase L1/A is the reference phase for all measurement.

1.5 Rapid Overview of Measuring Modes

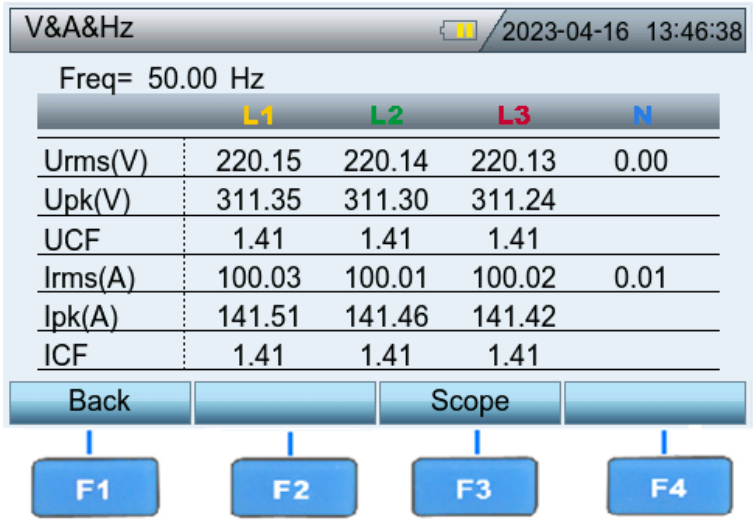
- ✧ **MENU**

Below measurements are available with【**MENU**】key:



1.6 Interface and Function Keys

✧ **Measuring Interface**



Interface information:

① The table header shows current measurement mode.

② Table in the middle of the interface display the measurement parameters and value, which depends on measurement mode, phase number and wiring configuration.

③ Function option lies in the bottom of the interface, touch screen operation, corresponding to **【F1】~【F4】** key.

Function keys instruction:

【F1】： Return to main menu

【F3】： Open scope interface

Chapter 2 Basic Operations

2.1Tilt Stand and Hang Strap

The tilt stand allows user to view the screen at an angle when place device on a flat surface. A hang strap is supplied for hanging the Analyzer, the installation as below picture show:

2.2 Power on/off

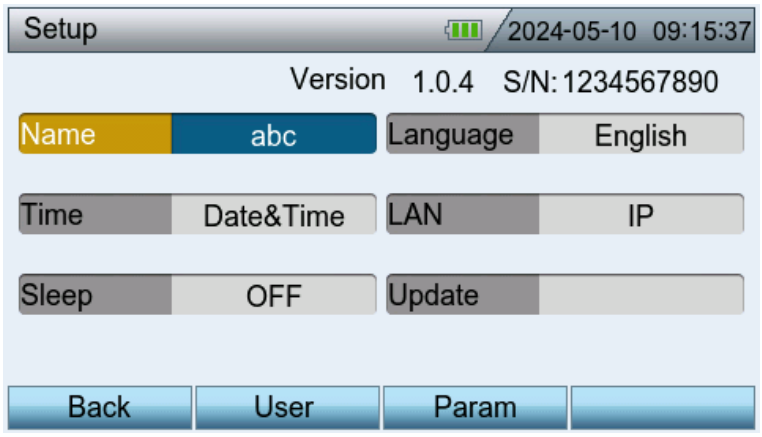
Press the Power key for 3seconds and a single beep can be heard, then the screen shows initial interface. Press the Power key in power on state, the Analyzer will prompt user whether power off the device, the device will power off after your confirm.

2.3 Display Brightness

The Analyzer provides 5 degrees of brightness, which is adjustable by pressing the brightness adjustment key. Low brightness is suggested to save the battery power when powered by the battery.

2.4 Update Firmware

- ✧ **User Settings Interface**



If any defective was found during the use of the Analyzer, please contact the customer service representative to get the update files.

Place the update files under the root directory of U disk, then insert to the Analyzer. After the U-disk is recognized by device, enter into 〈Setup〉 interface from main menu, select <User>, press 〈Update〉 to enter into update interface, take out the U disk until device prompt the update is completed , then power off the device and reboot it to complete the update, please don't power off the Analyzer during the update.

2.5 Input Connections

Check that the Analyzer setup meets the characteristics of the system under test. This concerns: wiring configuration, nominal frequency, nominal voltage, current clamp, and ratio of PT & CT, etc.

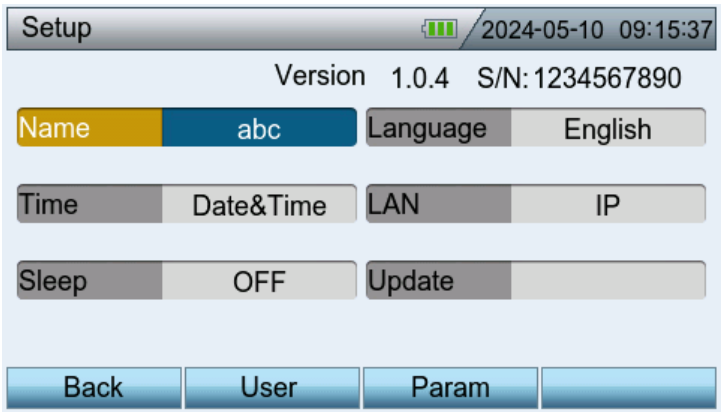
The Analyzer has 4 BNC inputs for current clamps and 5 banana-inputs for voltage test leads. De-energize power systems before making connections whenever possible, and use proper personal safety equipment.

For the connection of 3-phase system, please refer to chapter 1.3.

2.6 Setup Analyzer

- **Parameter Settings Interface**

✧ **User Settings Interface**



Parameters related to measurement can be set on the parameter setting interface, including wiring configuration, nominal frequency, nominal voltage, current clamp, phase color, PT&CT ratio and K-factor.

Touch <User> or press 【F2】key to switch to User setting interface.

Then you can set user information, including the user name, language, time, network address, sleep time, and upgrade in this interface.

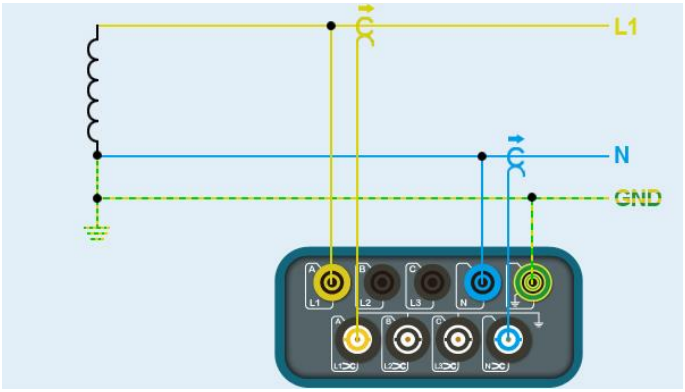
Touch <Param> or press 【F3】key to come back to parameter setting interface.

Operate by touch screen or【▲】【▼】【◄】【►】【OK】keys.

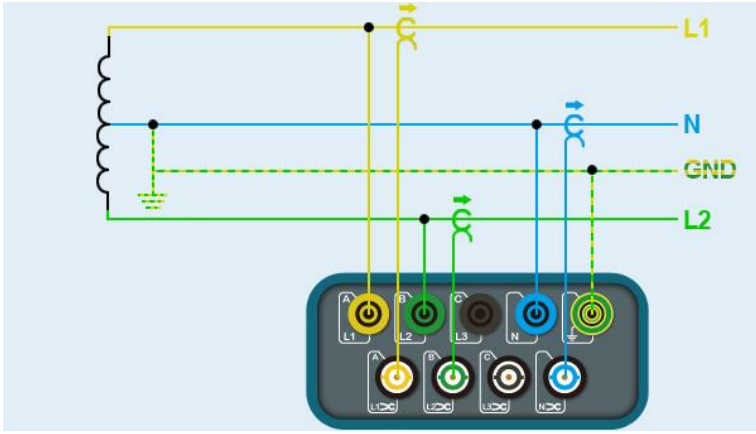
Sleep time: Key operation will be disabled after setting and the display brightness will be reduced to the lowest level. The setting brightness will be resumed after operating again. The working time of the analyzer powered on battery mode could be extend when start this function.

Wiring configuration diagram:

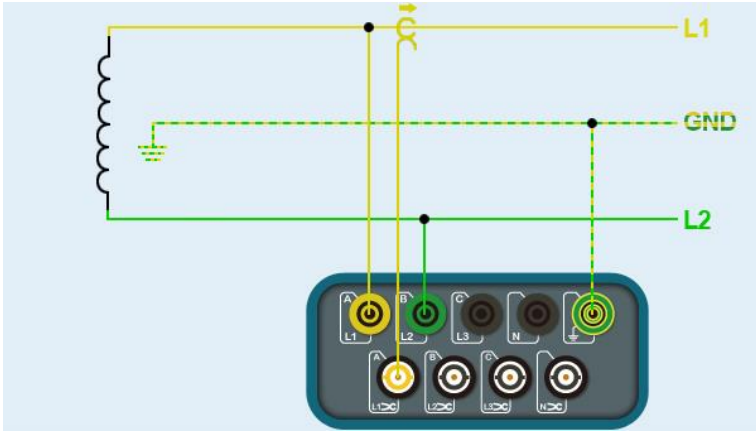
1P+NEUTRAL



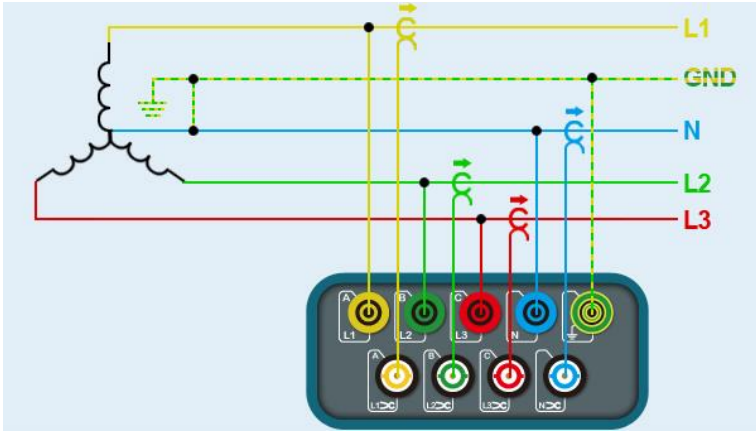
1P Split Phase



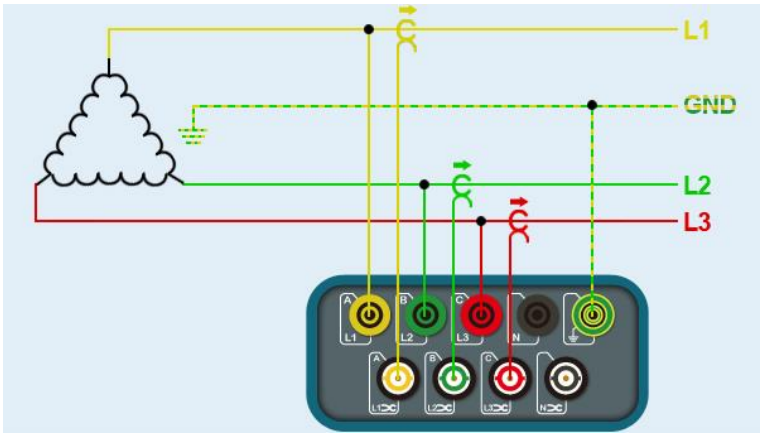
1P IT NO NEUTRAL



3P WYE



3P DELTA

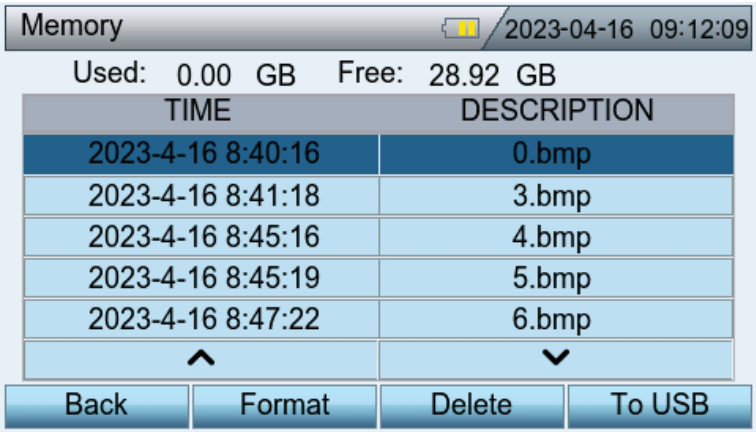


2.7 Using Memory and PC

The Analyzer can save screenshots into its memory, and the users can view, delete and copy them. The Analyzer can also be connected with a PC, through which the remote control of the Analyzer is available.

Screenshot operation: Long press 【**MEAS**】key can save current screenshot.

✧ **MEMORY Interface**



Select <Memory> from the main menu to enter the save list interface, which shows the create time and file name. Press【▲】【▼】 keys to select specified files. After accessing to the save interface, insert a U disk and wait, then U disk icon display on the state bar, press 【**F4**】(To USB) to copy the current selected flies to the U disk, then inset U disk to the PC to view the copied file through PQA View software.

Function keys instruction:

【F1】: Return to main menu

【F2】: Format the memory card

【F3】: Delete selected saved file

【F4】: Copy file to U disk

Installation requirement of PQA_Setup

CPU: processor over 1GHz

Memory: over 2G

Displayer: VGA or higher resolution monitor (resolution 1024×768 or above is recommended)

Hard disk: over 100M

Network card: 10M/100M network card

Operating system: Windows 7 or high version

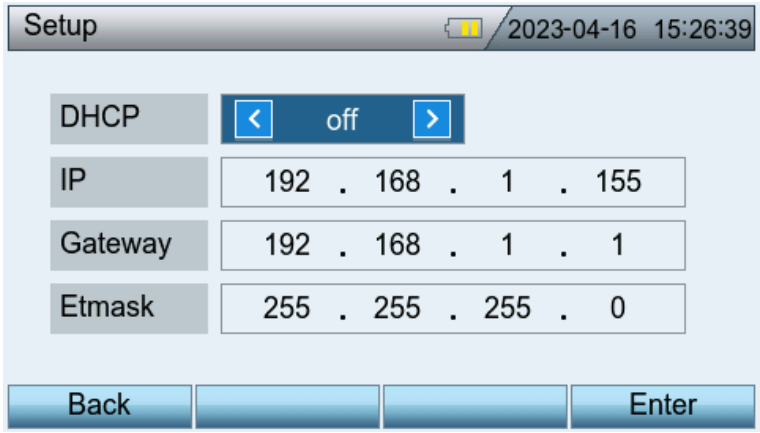
Microsoft Office version: Office 2007 or above

Network Settings

The LAN interface is configured to realize communication between device and PC.

The Analyzer is equipped with a LAN interface for communication with a PC. With supplied PC software, user can remote control analyzer, download saved files, analyze the data and create report on PC. In additional, user can also use the PC software to view the data and screenshot copied from a U disk.

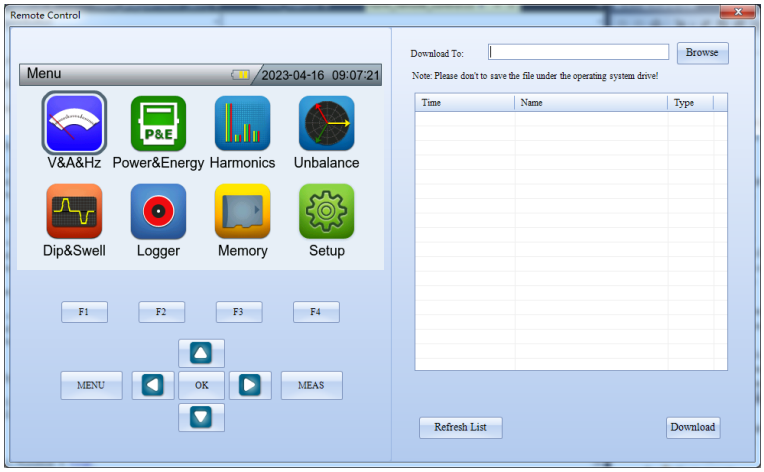
Select <User>setting in Setup interface to enter <LAN>to set as below picture shown:



Connect the Analyzer with PC by one piece of net cable, set IP address of Analyzer and PC to different, but should be in the same network segment. For example: IP address in PC is 192.168.1.XXX, while IP address in the Analyzer also should be 192.168.1.XXX

accordingly.

After a correct setting IP address for the analyzer, access the analyzer to the network by one new cable. Open PQA View software, select 【auto connection】or 【manual connection】(input IP address manually)in 【file】option, after a successful connecting, an operating interface which simulate the analyzer will pop up and user can download the saved file in device as below picture shown.



After PQA View_Setup.exe is installed, select 【User Manual】in 【help】option to check how to use the PC software naming PQA View.

Chapter 3 Function Introduction

3.1 Voltage/Current/Frequency

This function is used for measuring steady voltage, current, frequency and crest factors. The Crest Factor (CF) indicates the amount of distortion; a CF of 1.41 means no distortion and higher than 1.8 means high distortion.

✧ **Voltage/Current/Frequency Measurement Interface**

The number of columns in the measurement interface depends on the power system configuration. The figures in the interface are present values that may update constantly.

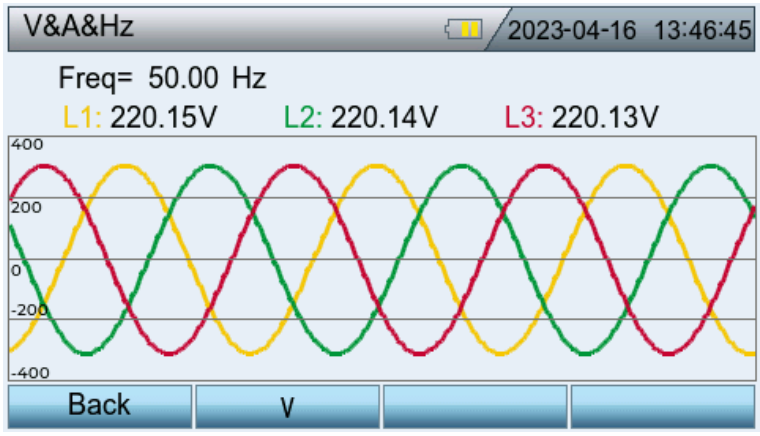
Long press **【MEAS】** key to save current screenshot.

【F1】： Return to main menu

【F3】： Into Scope interface

Scope mode shows voltages and currents in the power system under test by means of waveforms. Also numerical values are shown such as phase voltages, phase currents and frequency etc. The Scope waveform interface offers an oscilloscope style of display of voltage and current waveforms with a fast update rate. The interface header shows the related rms voltage/current values. Channel **L1/A** is the reference channel.

✧ **Scope Interface**



Function keys instruction:

【F1】: Return to Voltage/Current/Frequency menu

【F2】: Switch the waveform display of each channel

3.2 Power & Energy

Power and Energy displays a table interface with all important power parameters.

✧ **Power Measurement Interface**

Parameters instruction:

P (W): active power

S (VA): apparent power, multiply voltage RMS by current RMS

Q (var): reactive power of fundamental waveform

PF: power factor, divide active power by apparent power

cosΦ: displacement power factor, the cosine value of angle between fundamental voltage and current

tanΦ: the ratio divided reactive power by active power

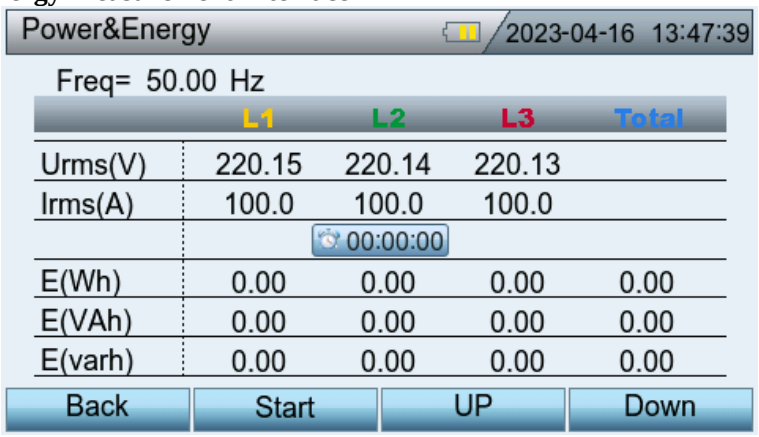
Function keys instruction:

【F1】: Return to main menu

【F3】: Page up

【F4】: Page down

✧ **Energy Measurement Interface**



Parameters instruction:

Urms: voltage root mean square.

Irms: current root mean square.

E(Wh): active energy

E(VAh): apparent energy

E(varh): reactive energy

Function keys instruction:

【F1】: Return to main menu.

【F2】: Begin to accumulate energy

【F3】: Page up

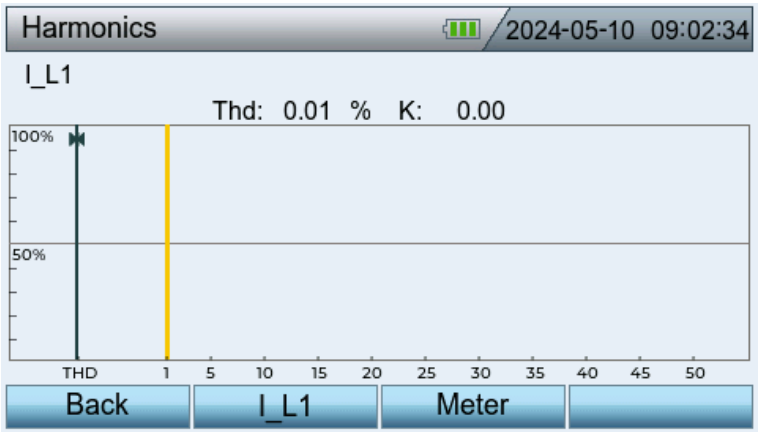
【F4】: Page down

3.3Harmonics

Harmonics function measure and record harmonics up to the 51th. Harmonics are periodic distortions of voltage, current or power sinewave. Waveform can be considered as a combination of various sinewaves with different frequencies and magnitudes. The Analyzer also measures its effect that harmonic component contribute to complete signal.

The measured value is displayed by bar graph. Harmonics are often caused by non-linear loads such as DC power supplies in computers, TV's and adjustable speed motor drives.
K-factor is shown on the top of the harmonic current screen, it is a number that quantifies potential overload in transformers due to harmonic currents. Higher order harmonic influence K-factor more than low order harmonic. Users can select the calculation way of it in function parameter interface.

✧ **Harmonic Bar Graph Interface**



The Bar Graph interface displays the ratio of each of the components related to the fundamental or full signal, expressed as a percentage. A signal without distortion should show 100% of the 1st harmonic while 0 of the others. in practice this will not occur because there always is a certain amount of harmonics resulting in distortion.
A sinewave becomes distorted when harmonics components are added to it. Distortion is represented by the Total Harmonic Distortion (THD) percentage. The bar graph can also show the percentage of each harmonic ratio.

【◄】【►】 arrow keys are used to position the Cursor on particular bar, the value of voltage/current, percentage, frequency, and phase angle corresponding to the harmonic are displayed.

Function keys instruction:

【F1】: Return to main menu

【F2】: Selection of bar set to be displayed: voltage L1, L2, L3 or current L1, L2, L3

【F3】: Access to table

✧ **Harmonic Table Interface**

The table interface lists all the harmonic parameters, including Harmonic Voltage, Harmonic Current, Interharmonic Voltage and Interharmonic Current. Select next page with up/down

Function keys instruction:

【F1】: Return to bar graph of harmonic

【F2】: Select voltage or current to display harmonic

【F3】: Page up

【F4】: Page down

Instruction:

%f: the percentage of harmonic component and fundamental signal

3.4 Unbalance

Unbalance displays phase relations between voltages and currents. Measuring results are based upon the fundamental frequency component (50 or 60Hz, use symmetrical components). In a 3- phase power system, the phase shift between voltages and between currents should be close to 120°. Unbalance mode offers a measurement table and a vector diagram interface.

✧ **Unbalance Measurement Interface**

Function keys instruction:

【F1】: Return to main menu

【F3】: Open Phasor interface

Parameters instruction:

Uneg: Negative sequence voltage unbalance

Ineg: Negative sequence current unbalance

Uzero: Zero-sequence voltage unbalance

Izero: Zero-sequence current unbalance

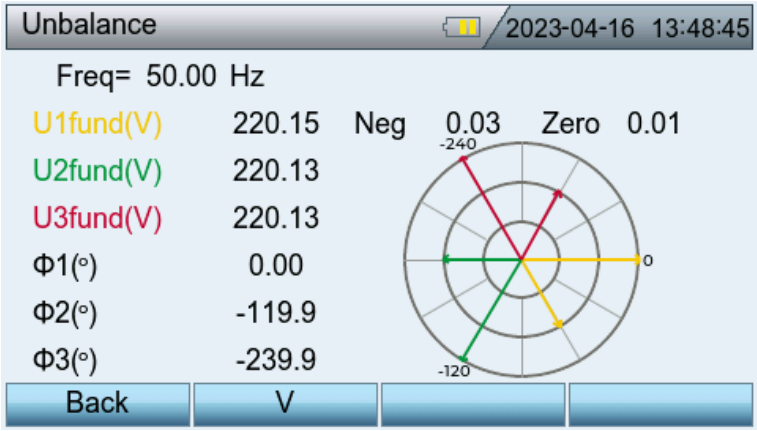
Ufund: Fundamental voltage **Ifund:** Fundamental current

ΦU(°): Fundamental voltage angle **ΦI(°):** Fundamental current angle

ΦI-U(°): The angle between fundamental voltage and current

The angle of each phase voltage and current is relative to angle of reference voltage L1/A.

✧ **Phasor Interface**



Shows the phase relation between voltages and currents in a vector diagram divided in 30

degree sections. The vector of the reference voltage **L1/A** points to the horizontal direction. Additional numerical values are given: negative voltage and negative current unbalance percentage, unbalance percentage of zero sequence voltage and zero sequence current, fundamental phase voltage and current, frequency, phase angles.

Function keys instruction:

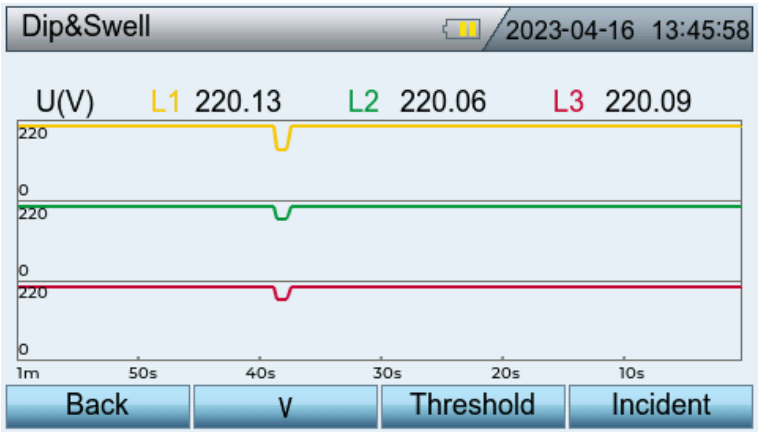
【F1】： Return to table interface

【F2】： Switch measured parameters, **V** displays all voltages; **A** displays all currents. **L1**, **L2**, **L3** give display of single phase voltage and current phase

3.5 Dips and Swells

Dips and Swells records Swells and Dips events. Dips and Swells are fast deviations from the normal voltage. Duration may vary from a half cycle to a few seconds.

✧ **Trend Interface**



During measurement, a dip begins when the voltage drops below the dip threshold value and ends when the voltage is equal to or above the dip threshold. Likely, a swell begins when the voltage rises up to the swell threshold value and ends when the voltage is equal to or below the swell threshold. Dips and Swells are characterized by the time of occurrence, extreme value and duration.

Function keys instruction:

【F1】： Return to main menu

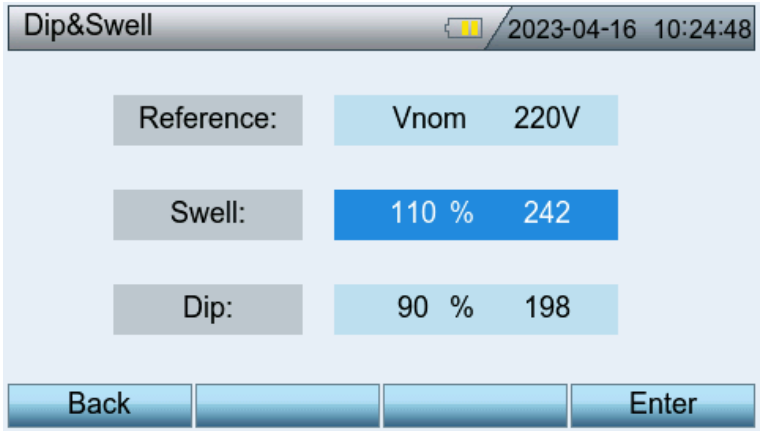
【F2】： Switch between voltage and current trends

【F3】： Threshold setting

【F4】： Access to Events tables

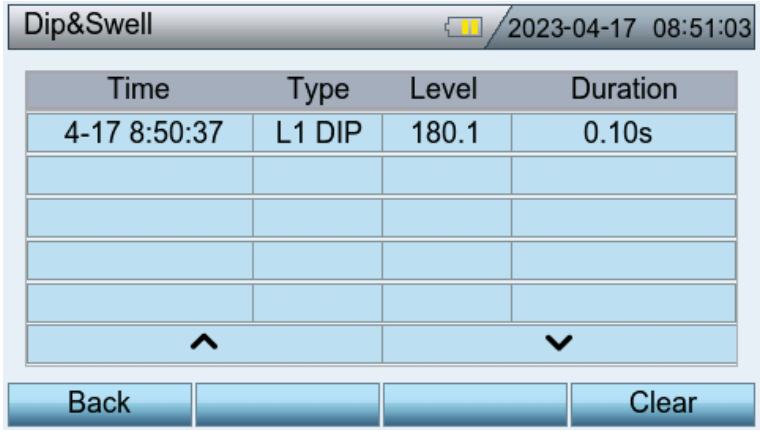
Event threshold is preset, but they may be adjusted. The adjustment menu is reached via pressing 【F3】 on trend interface.

✧ **Threshold adjustment Interface**



The Events table lists all the limits of phase voltages. The Events table records major event characteristics: start time, duration, voltage extreme value etc.

✧ **Events tables Interface**



The below abbreviation is used in the events tables

DIP：voltage dip

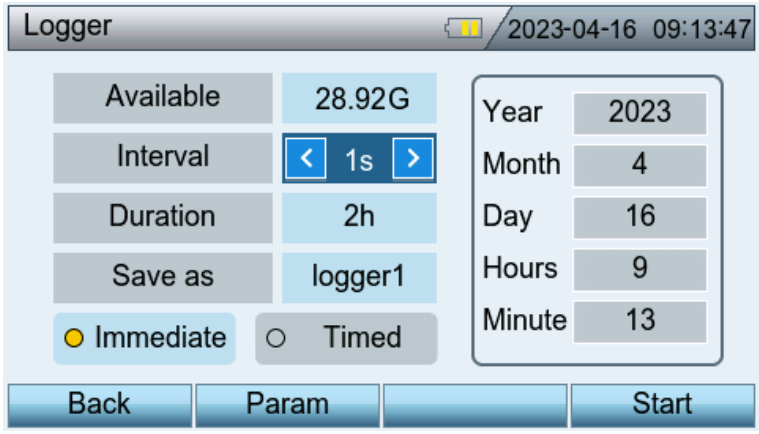
SWL： voltage swell

3.6 Logger

Logger function is used to record a group of measurement data as your selected parameter, the interval selected from 1s to 60 minutes. The whole process lasts as you selected duration time and the record parameter are all selectable for users. Press 【MENU】key,

use direction key to select logger function, press 【OK】key to enter into logger setting interface.

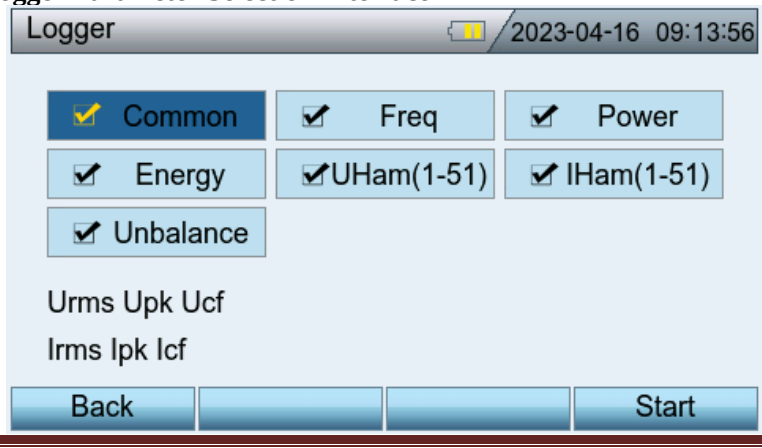
✧ **Logger Setting Interface**



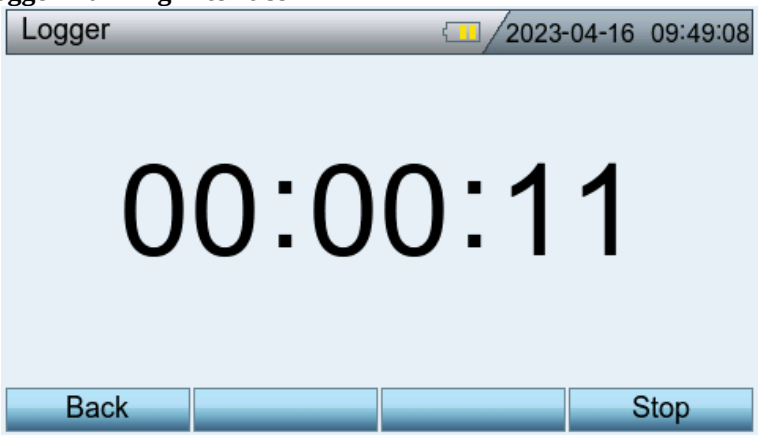
Here user can check remaining storage space, choose the needed logger parameters, set record interval, duration time, name of stored file and starting mode. Then press 【F4】to start. The record file is saved in built-in Micro SD card as csv format, each file can record 86400 data at most, then generate record file automatically. For example, set time interval to 1s, duration to 2 days, then 2 files will be generated: logger1.csv and logger1-1.csv, which could be opened and viewed by the provided PQA View software in CD after uploading to PC. The maximum recording time depends on the selected recording parameter and time interval.

Press 【F2】can enter into parameter setting interface, use direction key and 【OK】key to select the recording parameters, then press 【F4】to start.

✧ **Logger Parameter Selection Interface**



✧ **Logger Running Interface**



When Logger is running, it only displays the time has been running. Select other functions through **【MENU】** key to switch to other page you want to see real time data and details.

Function keys instruction

【F1】: Return to the previous menu

【F4】: To stop logger

Chapter 4 Service and Support

4.1 Warranty

Shijiazhuang Suin Instruments Co Ltd. will give one year's warranty to maintaining or replacing since consignment for the verified quality problem of the product.

Except for this explanation and the description in the warranty card, the company has no other warranty, in proclamation or in implication. Under no circumstances, the company will responsible for the direct, indirect or other secondary loss.

4.2 Contact us

If you have any questions or inconvenient during the use of our products please do not hesitate to contact us.

Monday to Friday 8:30-17: 00

Telephone: +86-311-83897147

Fax: +86-311-83897140

E-mail address: export@suintest.com

Website: www.suindigital.com

Chapter 5 Specifications

5.1 Voltage Input

Numbers of input	4 (3 phase + neutral)
Max continuous input voltage	600Vrms
Input impedance	1.8MΩ（L1/A,L2/B,L3/C,GND to N）

5.2 Current Input

Numbers of input	4 (3 phase + neutral)
Type	Clamp Current Sensor, with mV output
Max input voltage	1Vpk
Input range	Depend on current clamps

5.3 Measurement Range, Resolution, Accuracy

(AC)**Voltage/Current/Frequency**	Measurement range	Resolution	Accuracy
Urms (L1/A,L2/B,L3/C)	5~600Vrms	0.01Vrms	±0.2%±2 digits
Urms (N)	5~600Vrms	0.01Vrms	±0.5%±5 digits
Upk	7~850Vpk	0.01Vpk	±5%
U (CF）	1.0~2.8	0.01	±5%
Irms (without current clamps error) 10mV/A 1mV/A Flexible current clamps	 0~50A 1~500A 10~6000A	 0.01A 0.01A 1A	 ±0.2%±5 digits ±0.2%±5 digits ±0.2%±1 digits
I (CF)	1~10	0.01	±5%
Frequency 50Hz nominal Frequency 60Hz nominal	42.5~57.5 51~69	0.01Hz 0.01Hz	±0.01Hz ±0.01Hz
Note: Frequency measurement is based on voltage input L1/A			

Harmonic	Measurement range	Resolution	Accuracy
Harmonic order	1~51th		
Harmonic voltage %f	0.0~100.0%	0.01%	±0.1%±n×0.1%
Harmonic current %f	0.0~100.0%	0.01%	±0.1%±n×0.1%
THD	0.0~100.0%	0.01%	±2.5%
Frequency	0~2550Hz	0.01Hz	±1Hz
Phase	0~360°	0.01°	±n×1°
Absolute voltage	5~600V	0.01V	±5% reading (harmonics≥3% nominal value) ±0.15% nominal value (harmonics < 3% nominal value)
Absolute current	According to current clamps	0.01A	±5% reading (harmonics≥10%nominal value)

			±0.5% measurement range (harmonics < 10% nominal value)
K-factor	1-50	0.01	±10% (I_{RMS}≥1%I_{nom})
Note: n represents harmonic order			

Power and energy (without current clamps error)	Measurement range	Resolution	Accuracy
P、S、Q	Max3.6MW(without ratio)	0.01kW	±1%
PF	-1~1	0.01	±0.05
cosΦ	-1~1	0.01	±0.05
Wh、VAh、varh	Depends on clamp scaling and V nominal		±1%±10 digits

Unbalance	Measurement range	Resolution	Accuracy
Voltage unbalance	0.0~20.0%	0.1%	±0.5%
Current unbalance	0.0~20.0%	0.1%	±1%
Voltage phase	-360 ~ 0 °	0.01 °	±1 °
Current phase	-360 ~ 0 °	0.01 °	±1 °

Dips&Swells	Measurement range	Resolution	Accuracy
Urms½	0~200%nominal voltage	0.1Vrms	±1%
Threshold value	Threshold is settable according to nominal voltage percentage		
Duration	minute-second-millisecond	0.5 cycle	1 cycle

Logger	
Duration Time	2hrs ~ 1 year, depends on time interval
Interval	1s ~ 60mins

5.4 Wiring Combinations

1P+NEUTRAL	Single phase with neutral
1P Split Phase	Split phase
1P IT NO NEUTRAL	Single phase system with two phase voltages without neutral
3P WYE	3-phase 4-wire system, Y type
3P DELTA	3-phase 3-wire system delta (Delta)

5.5 General Characteristics

Interface	
USB Host interface	Support U disk with FAT32 form file system
LAN interface	10Mbps/100Mbps

Screen	Capacitive touch screen
Size	4.3 inch
Resolution	480×272

Brightness	Adjustable

Memory	
Micro SD	Standard 32GB

Case	
Drip and dust proof	IP53 degree. The IP rating refers to non-operation of the Product and does not indicate that the Product should be used around hazardous voltages in wet environments.

Standard	
Power and energy	IEC 62053-21, IEC 62053-23

Environment	
Working temperature	0 ℃~ 45 ℃
Storage temperature	-10 ℃~ 45 ℃
Humidity	90% relative humidity, non-condensing

Safety	
Complied with	IEC61010-1 Safety Degree: 600V CAT III Pollution Degree: II
Maximum voltage at voltage input	600V CAT III
Maximum voltage at current input	1Vpk

Mechanical	
Dimension	W×H×L≤158mm×200mm×47mm
Weight	Approximate 1 kg

Power	
Adapter input	AC 90~264V 47~63Hz
Adapter output	DC 5V 3A
Battery	2pcs 18650 Lithium battery: (3.6V 5100mAh)
Battery operating time	> 6 hours (screen brightness is in level 3)
Battery charge time	About 6 hours

5.6 The specification of optional current clamps

Model	**Range**	**Turns ratio**	**Accuracy**	**Size** mm
ST08	AC:0~5A	10mV/A	0.2%	Φ8
CTC0080	AC: 0~50A	10 mV/A	0.2%	Φ8
CTC0130	AC:1~100A	1 mV/A	0.2%	Φ13
SY-1500A	AC:10~1500A	100 mV/1000A	0.5%+(1%position error)	Φ110
PY-3000A	AC:15~3000A	65 mV/1000A	1.0%+(2%position error)	Φ160
SY-6000A	AC:20~6000A	65mV/1000A	1.0%+(2%position error)	Φ250