ATZ2000 Comprehensive Monitoring Unit User's Manual V1.0

Hangzhou Antin Power Technology Co., Ltd

Declarations

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Chapter 1 Product Overview

1.1 Product Introduction

ATZ2000 series multifunctional power analyzer can accurately measure and display various power parameters in single-phase two-wire, three-phase three-wire and three-phase four-wire power grids: voltage, current, power, frequency, active power, reactive power, forward power, reverse power, power factor, total harmonic distortion, subharmonic, maximum demand and so on. It is suitable for real-time power monitoring system, featuring multi-function, multi-purpose, high stability and long life. The meter adopts external transformer access, suitable for all kinds of high-voltage and low-voltage power grids, the maximum current up to 9999A, the maximum voltage up to 500000V. with RS485 communication interface, support the highest communication rate 38400bps, can realize remote communication, is the ideal choice for power energy monitoring. Setting parameters can be realized through the touch keys on the panel, easy operation and password protection, good security.

1.2 Product Features

- Peripheral wave sampling not less than 128 points, support for telecommunication, remote control, telemetry
- Compatible with single- and three-phase full grid system type access
- Measurement of split-phase and total power parameters
- Sub-harmonic measurements up to 63rd
- Support RS-485 communication

- Communication rate up to 38400bps
- Five touch button operation, friendly interface settings
- High-resolution large screen, gray background and black characters with a wide field of view
- Phase-by-phase and total power and current demand statistics
- Demand calculation mode, update period, slip time can be set
- Real-time display of load specific gravity fan chart
- Power factor bar graph indication
- Bidirectional metering, split-phase active and reactive power metering
- Unbalanced (zero line) current, voltage
- Phase sequence judgment, phase angle display
- Manual and automatic rotating display page turn, backlight delay can be set
- 8 time slot settings, 4 rate metering
- 1A/5A transformer type access, variable ratio settable
- Intelligent setting for forward and reverse wiring of split-phase transformers
- DI input stabilization time can be set according to actual demand
- DO level and pulse output can be set according to the actual demand.
- DO output delay can be set according to actual demand
- SOE device full event logging
- Removable and easy-to-maintain equipment batteries
- Dn housing, mounting size 92*92mm, extruded mounting, no need for snap fixing
- Pull-in connection

1.3 Product Parameters

Parameters that can be measured and displayed	
Instantaneous value (RMS)	
Voltage	Phase Voltage, Line Voltage
Current	Three-phase current
Active power	Total active power, split-phase active power
Reactive power	Total reactive power, split-phase reactive power
Apparent power	Total apparent power, sub-phase apparent power
Frequency	45-65Hz
Power factor	Total power factor, split-phase power factor
Total/forward/reverse active power	Range：0~999999.999kWh
Harmonic distortion	Voltage, current
Subharmonic	63 times
Requirement	Split-phase and total power and current
Settable parameters	
Modbus communications	Modbus Communication Address, Baud Rate, Parity Bit, Stop Bit
Variant analogy	CT, PT ratio and secondary value
System type	User password
Demand class	Demand reset
Pulse output class parameters	Pulse output setting

Time-based parameter	Automatic rotation time, backlight illumination time, system time, start time of the rate segment

Chapter 2 Technical Specifications

2.1 Technical Parameters

Technical Parameters			norm
Applicable networks			Three-phase four-wire, three-phase three-wire, single two-wire, three-phase three-wire PT
Operating power	Voltage range		AC/DC85~265V
	Power wastage		≤5W
Input	Voltage	Rating	AC100V、220V、400V
		Overloaded	1.2x continuous, 2x (10s)
		Power wastage	<0.4VA/ phase
		(electrical) impedance	≥200kΩ
	Current	Primary current	1-9999A
		Secondary input	1A or 5A

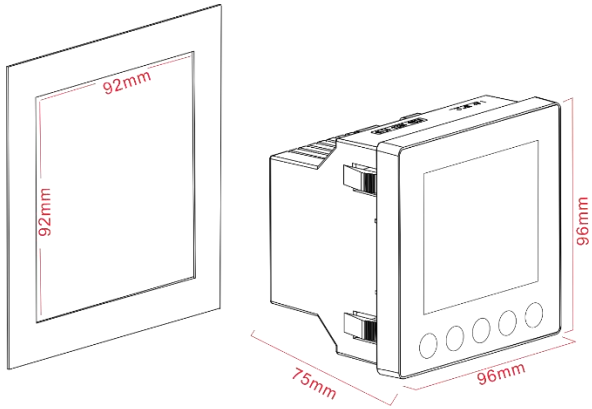
		Short-term overcurrent	20x maximum current for 0.5 seconds
		Power wastage	<0.2VA/ phase
		(electrical) impedance	≥0.1Ω
	Frequency		45Hz~65Hz
	Switching input		Dry Contact Input, Opto-Isolated
Output	Switching output		Relay output; any power alarm can be set, default remote control
	Pulse output		1 electrical energy pulse
Precision indicators	Voltage/current		0.5%
	Frequency		0.2%
	Power/Power Factor		1%
	Active degree of electricity		0.5S class
	Reactive power		1.0 class
Communication	Bus Type		RS485
	Communication protocols		Modbus RTU
	Baud		2400/4800/9600/19200/38400bps
	Address range		1-247
	Bus Load		64pcs

	Communication distance	1000m
	Parity	EVEN/ODD/NONE(default）
	Data bit	8
	Stop bit	1
Circumstances	Operating temperature	-25℃~55℃
	Storage temperature	-40℃~70℃
	Operating humidity	≤90%RH. Non-condensing, non-corrosive gas locations
	Storage humidity	≤95%RH. Non-condensing, non-corrosive gas locations
	Height above sea level	≤2000m
Installation category		CATIII
Pressure resistance		AC withstand voltage 4KV/1min Pulse withstand voltage 6kV - 1.2μS waveform
Protection class		IP51（interior）
Insulation class		II
Average trouble-free operation time		≥50000h
EMC electromagnetic compatibil	Electrostatic discharge immunity test	GB/T 17626.2-2006：Test level 4, test voltage 8kV
	Radio Frequency Electromagnetic Field	GB/T 17626.3-2006：Test level 3, test field strength 10V/m

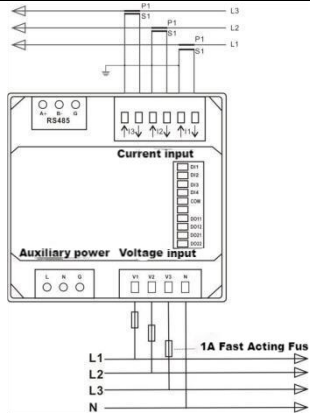
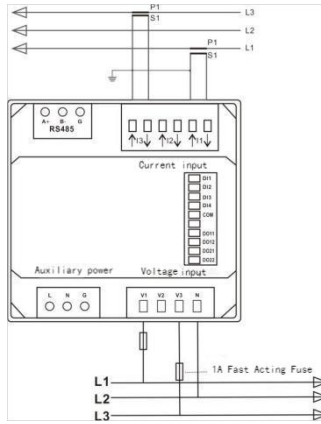
ity test	Immunity Test	
	Rapid transient pulse group test	GB/T 17626.4-2008：Test level 2, current voltage 1kV, other 500V
	Surge (shock) immunity test	GB/T 17626.5-2008：Test level 4, test voltage 4kV
	Conducted Nuisance Immunity Test for RF Field Induction	GB/T 17626.6-2008：Test level 3, test field strength 10V/m
	Immunity tests for voltage dips, short-term interruptions and voltage variations	GB/T 17626.11-2008：Current and voltage test error qualified
	Shock wave immunity test	GB/T 17626.12-1998：Class B ITE test, pass
Standards-compliant		GBT22264.1-2008 Mounted digital display electrical measuring instruments Part 1: Definitions and general requirements
		GBT22264.7-2008 Mounted digital display electrical measuring instruments Part 7: Special requirements for multifunction meters
		GBT22264.8-2009 Mounted digital

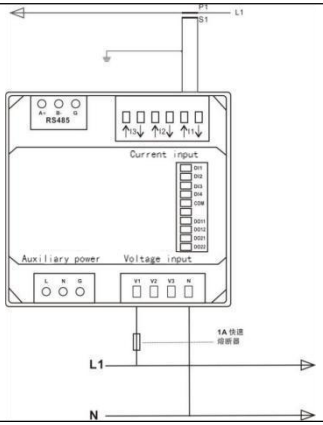
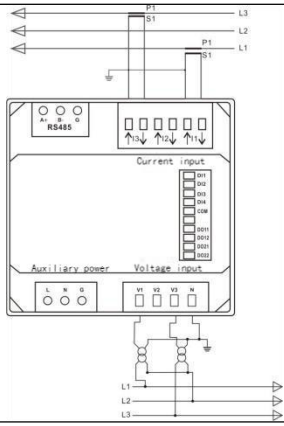
	display electrical measuring instruments Part 8: Recommended test methods

2.2 Outline/opening dimensions and installation drawings



2.3 Wiring diagram

Three-phase, four-wire

Three-phase, three-wire


Single-phase two-wire

Three-phase three-phase PT


Chapter 3 Operating Instructions

3.1 Description of panel key operation

After correct wiring, turn on the power to enter the normal measurement state, the screen displays as follows：

First screen	Power on full screen display
Second screen	Show software version
Third screen	Shows internal testing is complete

3.1.1 Key Definition

There are 5 buttons on the panel, from left to right they are“

”, “

”, “

”, “

”, “

”。

Button operation is divided into two kinds of long press and short press:

Long press: press the button for more than 2 seconds.

Short press: Pressing the key and releasing it within 1 second is a short press.

	Short press：1、Display the value of power, voltage and current of each phase; 2、Return to the previous menu or quit Long press: auto rotate function on/off
	Short press： 1、Display the current grid environment voltage, current value;

	Cursor to the left Long press：View voltage sub-harmonics (up to 63rd)
	Short press: 1, display power factor, frequency, maximum demand value; 2, upward scroll; 3, the increment of the number Long press: view current sub-harmonics (up to 63rd)
	Short press: displays the active power, reactive power and apparent power values in the current grid environment
	Short press： 1、Display the power information in the current grid environment; 2、Cursor moves to the right Long press： 1、Enter the setting mode; Setting confirmation key

3.1.2 Measurement Parameter View

keystrokes	three-phase, four-wire (4-wire)		three-phase, three-wire		Single-phase two-wire	
	demonstrate	parameters	demonstrate	parameters	demonstrate	parameters
	1	L1 power (W) L1 voltage (V)	1	L1 power (W) L1 voltage (V)	1	L1 power (W) L1 voltage (V)

		L1 current (A) L1 active power (kWh)		L1 current (A) L1 active power (kWh)		L1 current (A) L1 active power (kWh)
	2	L2 power (W) L2 voltage (V) L2 current (A) L2 active power (kWh)	2	L2 power (W) L2 voltage (V) L2 current (A) L2 active power (kWh)		
	3	L3 power (W) L3 voltage (V) L3 current (A) L3 active power (kWh)	3	L3 power (W) L3 voltage (V) L3 current (A) L3 active power (kWh)		

	4	L1 power (W) L1 voltage (V) L1 current (A) L1 reactive power (kVArh)	4	L1 power (W) L1 voltage (V) L1 current (A) L1 reactive power (kVArh)	2	L1 power (W) L1 voltage (V) L1 current (A) L1 reactive power (kVArh)
	5	L2 power (W) L2 voltage (V) L2 current (A) L2 reactive power (kVArh)	5	L2 power (W) L2 voltage (V) L2 current (A) L2 reactive power (kVArh)		
	6	L3 power (W) L3 voltage (V) L3 current	6	L3 power (W) L3 voltage (V) L3 current		

		(A) L3 reactive power (kVArh)		(A) L3 reactive power (kVArh)		
V/A	1	L1-N voltage L2-N voltage L3-N voltage			1	L1-N voltage
	2	Voltage L1-L2 Voltage L2-L3 Voltage L3-L1	1	Voltage L1-L2 Voltage L2-L3 Voltage L3-L1		
	3	L1 current L2 current L3 current N phase current	2	L1 current L2 current L3 current	2	L1 current
	4	L1 voltage	3	L1-2	3	L1 voltage

		total harmonics L2 voltage total harmonics L3 voltage total harmonics		voltage total harmonics L2-3 voltage total harmonics L3-1 Voltage total harmonics		total harmonics
	5	L1 current total harmonic L2 current total harmonic L3 current total harmonic	4	L1 current total harmonic L2 current total harmonic L3 current total harmonic	4	L1 current total harmonics
	6	phase sequence	5	phase sequence		
MD PF Hz	1	Total power	1	Total	1	Total power

		factor Frequency		power factor frequency		factor Frequency
	2	L1 power factor L2 power factor L3 power factor	2	L1 power factor L2 power factor L3 power factor		
	3	L1 Current Maximum Demand L2 Current Maximum Demand L3 Current Maximum Demand	3	L1 Current Maximum Demand L2 Current Maximum Demand L3 Current Maximum Demand	2	L1 Current Maximum Requirement
	4	Maximum total power requirement Maximum reactive	4	Maximum total power requiremen t Maximum reactive	3	L1 Maximum power requirement L1

		power requirement Maximum apparent power requirement		power requiremen t Maximum apparent power requiremen t		Maximum reactive power requirement L1 Maximum apparent power requirement
P	1	L1 active power L2 active power L3 active power	1	L1 active power L2 active power L3 active power		
	2	L1 reactive power L2 reactive power L3 reactive power	2	L1 reactive power L2 reactive power L3 reactive power		
	3	L1 apparent power	3	L1 apparent		

		L2 apparent power L3 apparent power		power L2 apparent power L3 apparent power		
	4	Total active power Total reactive power Total apparent power	4	Total active power Total reactive power Total apparent power	1	L1 active power L1 reactive power L1 apparent power
E	1	Total active power	1	Total active power	1	Total active power
	2	Total reactive power	2	Total reactive power	2	Total reactive power
	3	Positive active power	3	Positive active	3	Positive active power

				power		
	4	Reverse active power	4	Reverse active power	4	Reverse active power
	5	Positive reactive power	5	Positive reactive power	5	Positive reactive power
	6	Reverse reactive power	6	Reverse reactive power	6	Reverse reactive power

3.1.3 Subharmonic View

	Long press to view voltage subharmonics, the number of times contains 2 to 63.
	Long press MD PF Hz view the current subharmonics, the number of times contains 2 to 63.

3.2 Basic settings

3.2.1 Password access

	The setup mode is password protected and you need to enter the correct password before entering the setup mode. Long press E the setup screen appears, the number on the far left of the screen blinks, and the default password is 1000. Press MD PF Hz / P key to enter the password.Short press E acknowledging the numbers.Lastly, long press E confirm password. An incorrect password displays ERR.

3.2.2 Communication settings

	The RS485 communication port can be used for Modbus RTU protocol. The following parameters are optional: address, baud rate, parity bit, stop bit Long press E go to the Address Settings option.

3.2.3 Address Settings

	Address range: 001~247 Default: 001 Long press E entering the Selection Setup mode, there are characters flashing. Through MD PF Hz, P, E make address settings and finally long press E confirm by pressing the button

3.2.4 Baud rate setting

	Baud rate options: 2400/4800/9600/19200/38400(bps) Default: 9600bps Through MD PF Hz and P enter the baud rate setting interface.Long press E after the character blinks, press MD PF Hz or P selects the baud rate.
	Example: Setting the baud rate to 19200 (bps) Finally long press E key to confirm

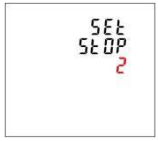
3.2.5 Check Digit Setting

	Check digit options: NONE, EVEN, ODD Default stop bit:NONE (Note: If the parity bit is set to ODD or EVEN, the stop bit can only be held at 1)

	Through MD PF Hz and P go to the check digit setting interface.Long press E after character blinking, press MD PF Hz or P selects the checksum bit.
	Example: Set the checksum bit to: EVEN Finally long press E confirm the settings. Short press Ph S Esc go back to the main Settings page.
	Example: Set the checksum bit to:Odd Lastly, long press E confirm the settings. Short press Ph S Esc Go back to the main Settings page.

3.2.6 Stop Bit Setting

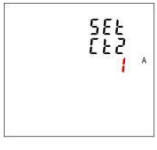
	Stop Bit Options: 1or2 Default Stop Bit: 1 （Note: If the parity bit is set to ODD or EVEN, the stop bit can only be held at 1.） Through MD PF Hz or P Enter the stop bit setting interface.Long press E, when the character starts to flash, press MD PF Hz or P make a selection.

	Example: The stop bit is set to: 2 Lastly, long press E confirm setting, press Ph S ESC return to the main Settings screen.

3.2.7 CT Settings

	From the main Settings screen.Through MD PF Hz and P key for CT selection settings.

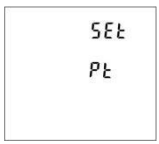
3.2.7.1 CT2 Settings

	Set the secondary measurement current option of the meter 5A or 1A Default CT2: 5A Long press E enter the CT2 setup screen.Long press E 2 seconds later, characters start blinking. Press MD PF Hz or P choose 5A or 1A。
	Example: Let CT2 be 1A Lastly, long press E key to confirm.

3.2.7.2 CT1 Settings

	Setting the primary measurement current option of the meter: 1~9999 default CT15A Long press E enter the CT1 setup screen. LOng press E 2 seconds, CT1 starts blinking. Through MD PF Hz and P key to set CT1: 1 to 9999. Lastly, long press E confirm the settings.
	For example, set CT1 to 100A. Long press E after confirming the settings, press Ph S Esc go back to the main CT Settings screen.

3.2.8 PT Setting

	From the main Settings screen. Through MD PF Hz and P key for PT selection settings.

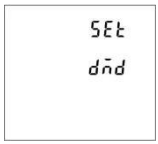
3.2.8.1 PT2 Settings

	Set the secondary measurement voltage of the meter Range: 100V~480V Default: 230V Long press E Confirm the settings.

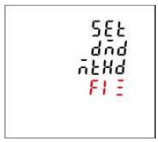
3.2.8.2 PT1 Setting

	Setting the primary voltage of the meter Range: 100V~500000V Default: 230V Press P key to enter the PT2 setup interface. Long press E key character starts blinking, through MD PF Hz and P, E to select PT2. Lastly, long press E confirm the settings.Press Ph S Esc key to return to the main PT Setup screen.

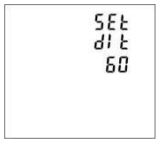
3.2.9 Demand cycle setting

	From the main Settings screen. Through MD PF Hz and P make the selection of the demand time period setting. The range of options is there:OFF，5，8，10，15，30，60 minute

3.2.9.1 Demand mode setting

	This screen displays the demand calculation mode: Slip mode Options: Interval mode and Slip mode Through MD PF Hz and P enter the demand calculation mode.
	Long press E key to enter the setting mode, character blinking appears. Through MD PF Hz and P key to find options.Long press E key to confirm the setting. Press Ph S Esc return to the Demand Setup menu.

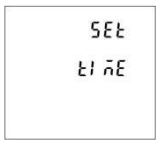
3.2.9.2 Demand update cycle (DIT) setting

	This screen displays the current selected demand update cycle. The default is 60 minutes with a range of 1 to 60 minutes.Off meter is this feature turned off. Long press E access to DIT settings. Long press E key for two seconds before the characters start flashing. Through MD PF Hz and P to select options. Lastly, long press E key to confirm.

3.2.9.3 Slip time

	This screen displays the slip time setting for slip mode. The slip time setting should not be greater than the demand update period.

3.2.10 Time setting

	This screen sets the time when the backlight is always on as well as the rotation time. In the Setup menu, pass the MD PF Hz and P key to select the time option.

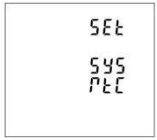
3.2.10.1 Backlight Time Setting

	This meter allows you to set the backlight illumination time Options: ON/OFF/5/10/30/60/120 minutes. Default: 60 minutes If 5 is set, the backlight will go out after 5 minutes. Note: If set to ON, the backlight will be always on Long press E key to enter the backlight constant light time setting. Long press P key, characters start blinking, through MD PF Hz and P key to select the option. Lastly, long press E key to confirm.

3.2.10.2 Screen rotation time setting

	This meter can set the rotation time, option: 1~255 seconds default: 5 If set to 5, the display will switch every 5 seconds. Through MD PF Hz and P enter the settings for the rotating display time. Long press E key 2 sec, characters start blinking. Through MD PF Hz and P carry out. Lastly, long press E key to confirm. Press Ph S esc go back to the Time Settings main menu.

3.2.11 System real-time clock setting

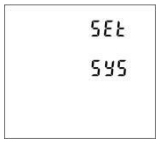
	This screen sets the meter's real-time clock. By pressing the E key to enter the date and time settings.
	Set the meter real-time date. Left: 2017-October-1 Displayed as: YYYY-MM-DD
	Setting the meter real time The left image shows 16:20:58 displayed as HH-MM-SS

3.2.12 Rate Time Setting

	This screen sets the time period for different rates Through E key to access time period and rate settings

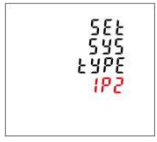
	Setting up time periods and corresponding rates Displayed on the left: Time 01 - time period number, range: 01 to 08 06:00 - start time of the time period, form: HH-MM FEE1-Rate 1, range 1 to 4. Through E key, users can set time periods and rate information

3.2.13 Type of grid system

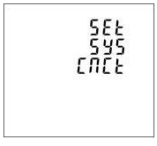
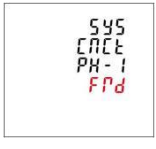
	The default setting for this meter is 3-phase 4-wire, other grid system options can be selected through the settings: 3P34,3P3W,1P2W From the Setup screen, pass the MD PF Hz and P key to select the grid system type

3.2.14 System type

	This screen shows that the grid mode is now 3-phase 4-wire Long press E key to enter the grid system type selection. Long press E key, character blinking occur. Through MD PF Hz and P key to choose. Lastly, long press E key to confirm

	For example, the screen shows that the present mode is three-phase, three-wire.
	Example: The screen displays the offline mode as single-phase, two-wire.

3.2.15 System connection settings

	This meter can correct the inversion of the transformer. (Reversed in/out transformers can be set by the meter without removing wires.) Through MD PF Hz and P to select the correction option.
	Options: Frd (forward wiring) and rEv (reverse wiring) Default: FRD (forward wiring) Long press E key to enter the A-phase correction screen. Long press E key, characters start blinking, Through MD PF Hz and P carry out a selectio. Lastly, long press E key to confirm

	Press P key to enter the B-phase correction screen. Long press E key, characters start blinking Through MD PF Hz and P make a selection. Lastly, long press E key to confirm
	Press P key to access the C-phase correction screen. Long press E key, characters start blinking. Through MD PF Hz and P make a selection. Lastly, long press E key to confirm the setting. Press Ph S ESC key to return to the main Settings screen.

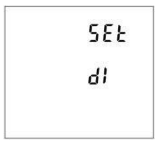
3.2.16 Modify a password

	Default: 1000 Options:0000~99999 Through MD PF Hz and P to change your password
	Long press E key, characters appear to flicker， through MD PF Hz and P, E key to make a selection. Lastly, long press E key to confirm.

3.2.17 Auto Rotation Setting

	This meter can be set up with automatic display rotation Options: on and off There are two ways： ①Through MD PF Hz and to make automatic rotating display function settings.Long press E key, characters start blinking. Through MD PF Hz and P Select "On" or "Off". Lastly, long press E confirm
	②Exit Setup button. Long press Ph S ESC 2 seconds For example, the picture on the left now shows the autorotation function ON (on).
	Long press Ph S ESC key, the screen displays the automatic rotation function OFF (off).

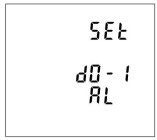
3.2.18 Digital Input (DI)

	Press E key to access the submenu.

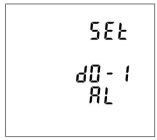
	Set the duration of DI filtering for the digital input signal. The left graph shows 100mS
	This screen is used to view the count of each digital input. Press E key, user can see the count.
	The figure on the left shows digital input 1, count 8. Through press MD PF Hz and P key, the user can see the counts of different digital inputs.

3.2.19 Digital Output (DO)

	This screen is used to set the digital output parameters and view the status. Through press E key go to the submenu.

	This screen selects the number of digital outputs to be viewed The figure on the left shows DO-1. Through E key, user can set and view the parameters and status of the DO-1. Through MD PF Hz and P, user can select different digital outputs.
	This screen is used to set alarm messages related to DO-1
	This screen sets the digital output mode of the DO-1. Left display: LEVE LEVE=Level level mode PULS=Pulse pulse mode
	This screen is used to control the status of DO-1 The left figure shows the status as disconnected.

3.2.20 DO Alarm Setting

	This menu is for DO alarm setup options.
	The alarm function can be associated to the following parameters: U1,U2,U3,Unav(L-N) U12,U23,U31,Uuav(L-L) I1,I2,I3,Iav,In P1,P2,P3,P-total Q1,Q2,Q3,Q-total S1,S2,S3,S-total PF1,PF2,PF3,PF-total F(frequency) Null indicates that no parameters are associated.
	This option sets the DO action delay time in ms. The figure on the left shows 200ms.
	This option sets the high value for DO-1 closure. The figure on the left shows: HC 1000V, indicating that DO-1 will close when U1 reaches 1000V.

	This option sets the high value at which DO-1 disconnects. The graph on the left shows: HO 800V, indicating that DO-1 will disconnect when U1 drops to 800V.
	This option sets the low value at which DO-1 closes. The left graph shows LC 100V, indicating that DO-1 closes when U1 is as low as 100.
	This option sets the low value at which DO-1 closes. The left graph shows LO170V, indicating that DO-1 will break when U1 rises back to 170V.

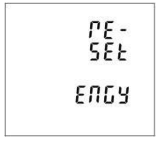
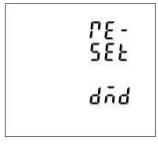
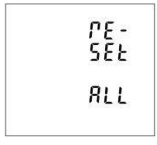
3.2.21 SOE (recorded information on events)

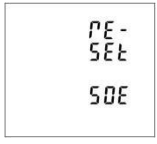
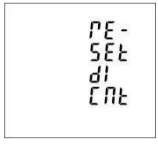
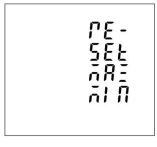
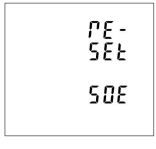
This meter provides event logging function, which can record up to 30 events as follows: 1, power off 2, power on 3, CT2 change 4, CT1 change 5, PT2 change 6, PT1 change 7, power zero 8, demand zero 9, alarm occurrence

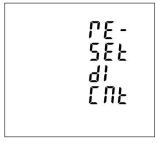
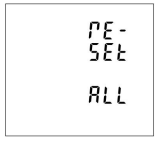
	This menu is used to view event logs up to 30 times. Through press E key to access the submenu.

	The left image shows the first event record Through press MD PF Hz and P key, user can view other event log information.
	Through press E key, user can view the date and event that the event occurred.

3.2.22 Zero

	Zeroing of power (including active power, reactive power, apparent power, forward and reverse power).
	Current demand, power demand clear.
	All parameters are cleared to zero.

	This screen provides various parameter clearing functions. Press E key to enter the submenu. Through MD PF Hz and P key to select the clear option.
	SOE (event logging) cleared to zero
	DI count clear
	Maximum and minimum value clearing
	SOE (event logging) cleared to zero

	DI count clear
	All parameters are cleared to zero

3.2.23 Battery replacement

The meter has a compound rate as well as a real time clock function, and it has a 3V DC battery as a back-up power supply. When the battery voltage falls below 2.4V DC, the meter's LCD displays a warning symbol user will need to replace the battery with a new one.

When replacing the battery, make sure that the voltage input of the meter is not connected.

Liquid Crystal Segment Code English Correspondence Table

1	2	3	4	5	6	7	8	9	0	A	B
C	D	E	F	G	H	I	J	K	L	M	N
O	P	Q	R	S	T	U	V	W	X	Y	Z

After-sales service

1. If the user does not understand the description in the manual during installation and commissioning, please contact the aftersales team.
2. The company's technology is ready to answer product-related questions.
3. The problems arising in the use of the product will be replied within one working day.
4. Our company has a one-year free warranty for the above products from the date of sale.

Technical descriptions are subject to change without notice

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