ARZ-5D DIN-rail Multifunction power meter

Operation Manual

V 0.01

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Shenzhen Artel Tech.Co.,Ltd.

Preface

Thank you for choosing **ARZ-5D DIN-rail Multifunction Power Meter**。

Other electric measurement products:

1. PRO series electric transducer
2. PRO EX series digital panel meter
3. DNS/DNXS 9000 active/reactive energy meter
4. PRO M31 programmable transducer
5. MDM3100/MDM3001S multifunction power meter

If you need know more information about our product or you get any problem in your usage, pls contact with our staff.

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Declaration

This manual represents your ARZ-5D as manufactured at the time of publication. It assumes standard software. Special versions of software may be fitted, in which case you will be provided with additional details.
Every effort has been made to ensure that the information in this manual is complete and accurate. We updated this manual but cannot be held responsible for errors or omissions.
We reserve the right to make changes and improvements to the product without obligation to incorporate these changes and improvements into units previously shipped.

Warning Notice

ARZ-5D shall function properly under the following working conditions:

1．Auxiliary power supply: 85~265VAC/DC. MDM3100 might be damaged or function improperly if the power supply is out of range.

2．For the secondary measurement, line Voltage range:0~500V, phase Voltage range: 0~288V, Current range 0~6A or 0~80A. ARZ-5D might be damaged or function improperly if the measurement is out of above range.

3．Please wire the meter strictly following the wiring connection in the manual.

4．Operation Temperature: -20℃~60℃ ARZ-5D might be damaged or function improperly if the temperature is out of range.

Please allow the trained expert to do the installation, operation, or maintenance work.

 The sign indicates there is potential electrical power danger, which might result in the harm if not following the rule.

 Te safety warning sign is to remind you the potential danger.

For your safety reason, please properly use our products. It is strongly recommended that you follow the instructions:

5. Please connect to the power and load as rated in label.
6. Please confirm that the wire is connected correct, to avoid the harm resulting from the wrong connection.
7. Please turn off the power system before the maintenance of the meter.
8. Please avoid use with high voltage and big current.

Table of Contents

Preface 1

Declaration 1

Warning Notice 2

Ⅰ. Product Description 4

1. Profile 4
2. Measured Scope 4
3. Function description 4
4. Measurement Accuracy 7
5. Technical specification 7
6. Parameter Setup 8
7. EMC and Safety Standard 8
8. Terminal Diagram 9
9. Wiring diagram 10
10. Installation 12
11. Interface 12
    11.1 Button introduction: 12
    11.2 Display status introduction 14
    11.3 Parameter scroll display mode 14
    11.4 Parameter quick query mode: 15
    11.5 Menu interface 16

II Software Description 47

1. Function Description 47
2. Software installation 47
3. Operation Page Setup 50
4. Interfaces Description 51

III. Communication 63

1. Communication Protocol 63
2. RTU Command Format and Example 63
3. Data Format 65

Ⅰ. Product Description

1. Profile

ARZ-5D is a powerful multifunction power meter with DIN-rail design, which can be applied for monitoring and analyzing of the electrical system. ARZ-5D can measure and analyze real time data, such as U, I, P, Q, S, COSΦ, F, kWh, kVArh, kAVh, etc. ARZ-5D has the following functions: RS-485 communication port (Modbus protocol) or M-BUS port (only one communication port can be chosen), 4 programmable I/O port which can be programmed as alarm output, pulse output, multi-tariff source input, and status inspection input. The meter can record system log, event log, and power quality log, at the same time, it can support 25 channels alarm, record 50 channels demands, 50 channels energy frozen record, and 16 channels lode curve. With 128*64 lattice LCD screen, the meter can display several measured parameters.

In multi-tariff function, a year can be divided as 12 time zones, and each time zone can choose one of 8 time tables to use. In one time table, a day (24 hours) can be divided as 12 time sections and the min. interval of each time section is 15 minutes. Each section can be configured as sum, sharp, peak, flat, valley energy. The meter can read and query the sum, sharp, peak, flat, valley energy data of every day, every week or every month and has the function of energy frozen function.

With harmonic analysis function, $2^{nd}$to 63^{rd} harmonics data of input signal can be measured, which include Voltage and Current harmonic content, harmonic distortion, phase angle; fundamentalVoltage/Current, fundamental active/reactive/ apparent power.

The devices have been developed, manufactured and tested in accordance with Quality Assurance System ISO 9001.

2.Measured Scope

ARZ-5D can be applied in Single phase, 3P3W, 3P4W electric system (include unbalance load); It can be applied vastly in the second measurement in high voltage and low voltage electric system and measured data communication.

3.Function description

Function	Description	
Real time measurement	Phase Voltage	Phase Voltage
	Line voltage	Line Voltage
	Current	Phase Current, zero sequence Current
	Active power	Phase active power, 3 phases active total power
	Reactive voltage	Phase reactive power, 3 phases reactive total power
	Apparent power	Phase apparent power, 3 phases apparent total power
	Power 4 quadrant	Power 4 quadrant

	Frequency	System frequency
	Power factor	Phase power factor, average power factor
Energy measurement	Active energy	Imported/exported/net active energy in each phase, Total imported/exported/net active energy
	Reactive energy	Imported/exported/net reactive energy in each phase, Total imported/exported/net reactive energy
	Apparent energy	Phase apparent energy, 3 phases total apparentenergy
	Tariff Energy	Total active/reactive energy in T1/T2/T3/T4
	Quadrant energy	Total active/reactive energy of 4 quadrants
I/O port	Programmable I/O port	4 channel programmable I/O port, can be configured as input I/O port or output I/O port. Input I/O port can be set as tariff input or status detection. Output I/O port can be set as pulse output or alarm output.
Alarm output	Alarm	Support Max. 25 channels alarm functions. Each channel can set different alarm carrier parameters, and the alarm output can be configured to programmable output I/O module. Multiple alarm output can be configured to one I/O output port. Each alarm I/O port has the function of alarm counting.
Pulse output	I/O pulse	Max. 4 pulse output ports can be configured. Each pulse can choose 4 pulse sources and choose 1 available I/O port to output. 1 I/O port can only configure one pulse output function.
Multi tariff	I/O port tariff source	I/O1, I/O2 can be configured as tariff source input port. The system tariff of this function is controlled by level state. The 2 I/O ports have 4 high or low level states, which correspond to T1, T2, T3, and T4.
	Clock Calendar	Internal system clock calendar can be configured as tariff source. Internal clock calendar is a user-defined tariff calendar, which supports max. 12 time zones in a year, in each time zone the user can choose one of 8 time tables to measure tariff energy. The user can set max. 245 special day tariff.
	Software communication	System tariff is controlled by PC software communication. The tariff used currently is totally controlled by PC command.
State detection	I/O port state input	I/O1, I/O2 can be configured as state detection input port. The state change can be judged by high or low level states. State detection has state input counting function.
Log record	System log	Record system unusual information, which include hardware detection, power on/ off record, register modified record and so on. Max. 500 system logs can be recorded.

	Event log	Record the alarm which related with event and configuration alarm. Event log is associated with alarm event. Max. 500 event logs can be recorded.
	Power quality log	Record power quality unusual event. Power quality log is associated with alarm event. Max. 500 event logs can be recorded.
Demand record	Demand calculation and storage	Support max. 50 channels demand calculation and record function and each channel can store max. 200 demand data. Each demand channel can set different demand carrier parameters.
Energy freeze record	Storage energy data regularly	Support max. 50 channels energy freeze records and each channel can store max. 200 energy records. Each energy freeze channel can set different energy carrier parameters.
Load curve record		Load curve record is a record function to draw data curve thru the high density and large amount of storage data. The curve drawing needs the PC support. Support max. 16 channels load curve record function and each channel can store max. 2000 records.
Harmonic analysis	Voltage harmonic content	2^{nd} ~63^{rd} Voltage harmonic content in each phase
	Current harmonic content	2^{nd} ~63^{rd} Current harmonic content in each phase
	Voltage harmonic phase angel	2^{nd} ~63^{rd} Voltage harmonic phase anglein each phase
	Current harmonic phase angle	2^{nd} ~63^{rd}Current harmonic phase anglein each phase
	Voltage total harmonic distortion	Each phase voltage total harmonic distortion
	Current total harmonicdistortion	Each phase current total harmonic distortion
	Fundamental content	The fundamental content of voltage, current, active power, reactive power and apparent power in each phase.
Data communication	RS-485 port	1 channel Modbus-RTU protocol, share a commu. port with M-BUS
	M-BUS port	1 channel Mbus protocol, share a commu. port with RS-485
Time display	Clock	Year, month, day, hour, minute, second
Language	Chinese display	
	English display	

4. Measurement Accuracy

Parameters	Display	Direction	Accuracy
Voltage	0～9999kV		Class 0.5 scope:5%~100%V
Current	0～9999kA		Class 0.5scope: 5%~100%A
			Zero sequence Current Class1.0
Power factor	-1～＋1	Directional	Class 1.0
Frequency	45～65Hz		±0.01Hz
Active Power	-9999～9999MW	Directional	Class 0.5
Reactive Power	-9999～9999MVAr	Directional	Class 0.5
Apparent Power	0~9999MVA		Class 0.5
Active Energy	0~9999999.99MWh	Directional	Class 0.5 or 1.0
Reactive Energy	0~9999999.99MVArh	Directional	Class 1.0 or 2.0
Apparent Energy	0~9999999.99MVAh		Class 2.0

5.Technical specification

Input Current	
Rated Current: 5A or 80A Measurement scope: 0.5%~120% Overload capacity: 2 X rated continuously, 100A/1s non continuously Power consumption: ≤0.2VA per phase	
Voltage Input	
Voltage Range: 288VAC (Phase Voltage) , 500VAC (Line Voltage) System frequency: 45~65Hz Measurement scope: 3%~120% Overload Capacity: 2 X rated continuous, 2500V/1s non continuous Power consumption: ≤0.5VA per phase	
Programmable I/O port	
Input /Output Channels Input Type Output Type Isolated Voltage	2 channels input, 2 channels output (default) 0-24V DC Voltage Dry contact >2500VAC
Alarm Output	
Output Channels Output Type Contact Capacity	2 channels alarm outputs (default), or customized Passive optocoupler, can be configured as alarm normally Open or Closed 50mA/24VDC
I/O pulse output	
No. of outputs Output type	2 channels alarm outputs (default), or customized Passive optocoupler, pulse carrier parameters can be

	configured
Pulse frequency	1~9999imp
Pulse width	10~990ms
LED Pulse output	
No. of outputs	1 channel LED pulse output, indicating the total active energy of input or output.
Pulse frequency	400imp/kWh
Pulse width	40ms
Serial com. port (choose one com. port)	
NO. of outputs	1 RS-485 port or 1 M-BUS port (share one port)
Communication protocol	Modbus-RTU protocol or M-BUS protocol
Baud rate	1200/2400/4800/9600/19200 bps
Other parameters	
Auxiliary Power	85~265VAC/DC (When it is DC power, No direction)
Display module	LCD lattice screen Display
Temp. drifting factor	＜100PPM/℃
Withstand Voltage (Input against output)	2500V/1 min
Total power consumption	＜8VA
Operation temperature	-20℃~60℃
Storage temperature	-40℃~85℃
Operation humidity	5~95％ RH
Pollution Class	Class 2
Material of Housing	Flammability acc. to UL94V0
Protection Class	IP 30
Dimension	126×89 × 74 mm

6.Parameter Setup

The programmable parameters include: clock, wiring mode, ratio, tariff, communication address, baud rate, data storage mode, pulse, alarm, state action, demand record, energy frozen, load curve, data reset, user password and so on.
The above parameters can be modified by software or meter operation.

7.EMC and Safety Standard

- IEC61000-4-2 (GB/T17626.2)；
- IEC61000-4-8 (GB/T17626.8)；
- IEC61000-4-4 (GB/T17626.4)；
- IEC61010-1 (GB/T4793.1)。

8. Terminal Diagram

1		LN	ARZ-5D	LN*		8
	9	B-		N	20	
	10	A+		L	19	
2		L3		L3*		7
	11	COM4		I/O1	18	
	12	I/O4		COM1	17	
3		L2		L2*		6
	13	COM3		I/O2	16	
	14	I/O3		COM2	15	
4		L1		L1*		5

Fig. 1 Terminals Definition

Terminal definition

Terminal No.	Description	
1	LN	Phase A/B/C Current signal output ports. Phase A/B/C live wire and neutral wire output ports.
2	L3	
3	L2	
4	L1-	
5	L1*	Phase A/B/C Current signal input ports. Phase A/B/C live wire and neutral wire input ports.
6	L2*	
7	L3*	
8	LN *	
9	B-	RS485 com. port or M-BUS com. port (share)
10	A+	
11	COM4	The forth programmable I/O port, default as output port.
12	I/O4	
13	COM3	The third programmable I/O port, default as output port.
14	I/O3	
15	COM2	The second programmable I/O port, default as input port.
16	I/O2	
17	COM1	The first programmable I/O port, default as input port.
18	I/O1	
19	L	Aux. power supply input port (85~265VAC/DC)
20	N	

9.Wiring diagram

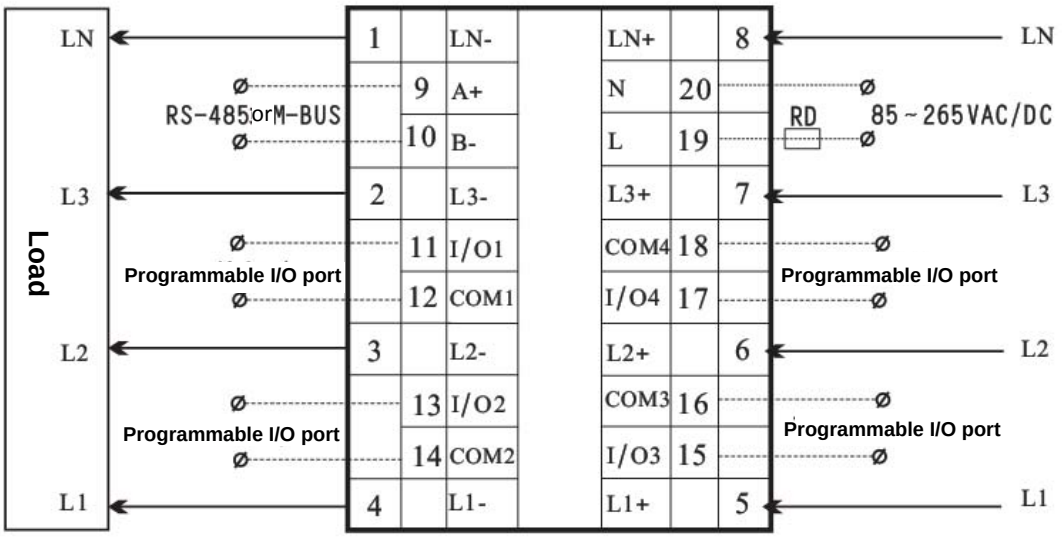


Fig. 2 3P4W Wiring Diagram

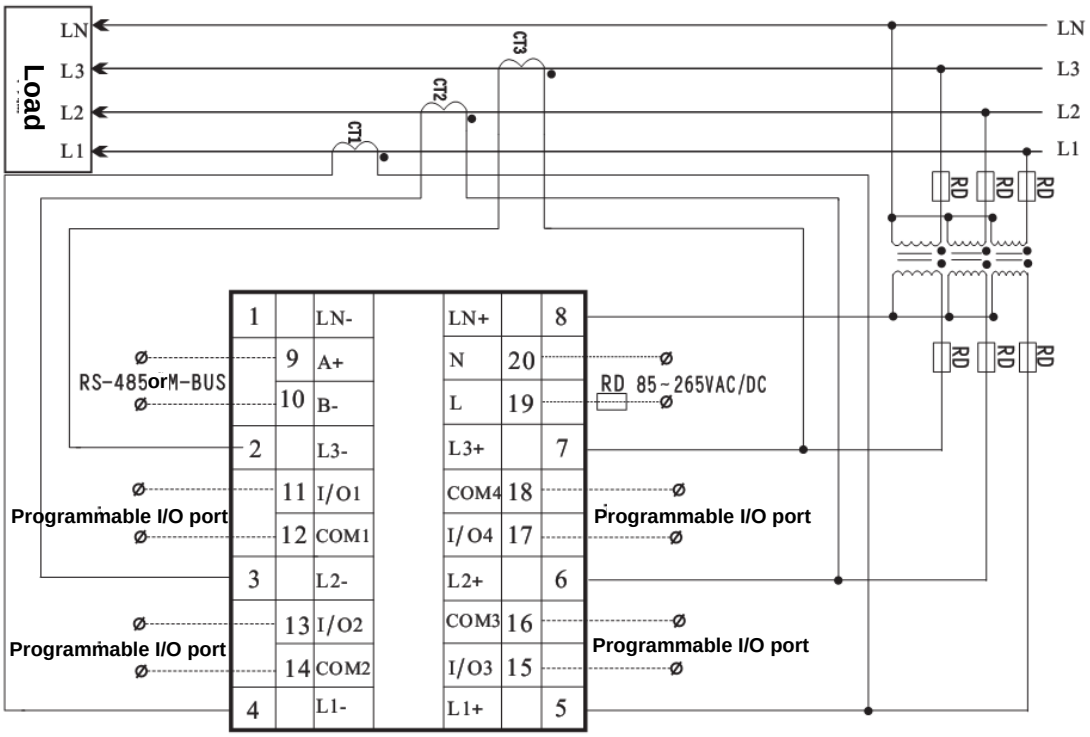


Fig. 3 3P4W with PT/CT Wiring Diagram

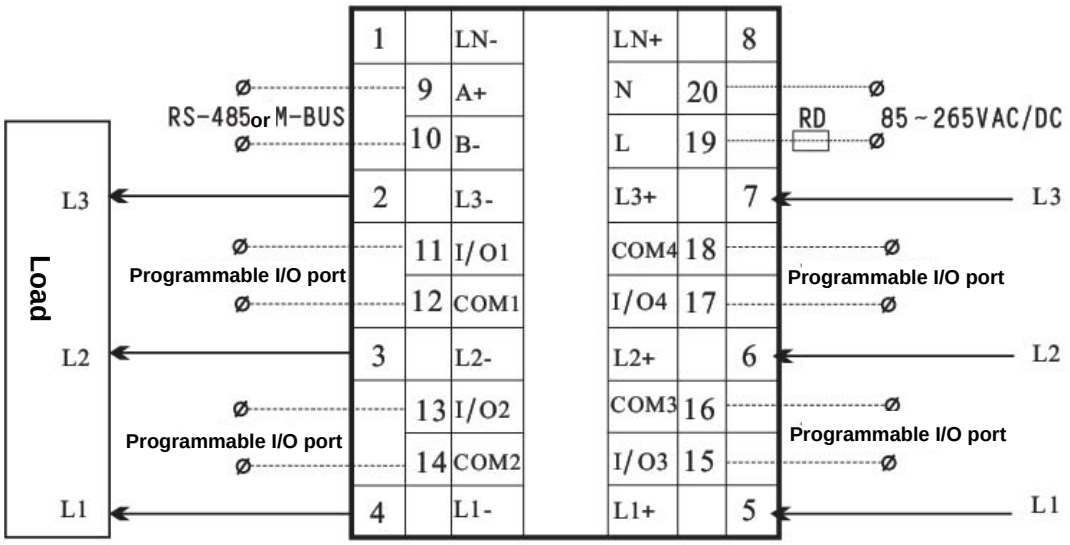


Fig. 4 3P3W Wiring Diagram

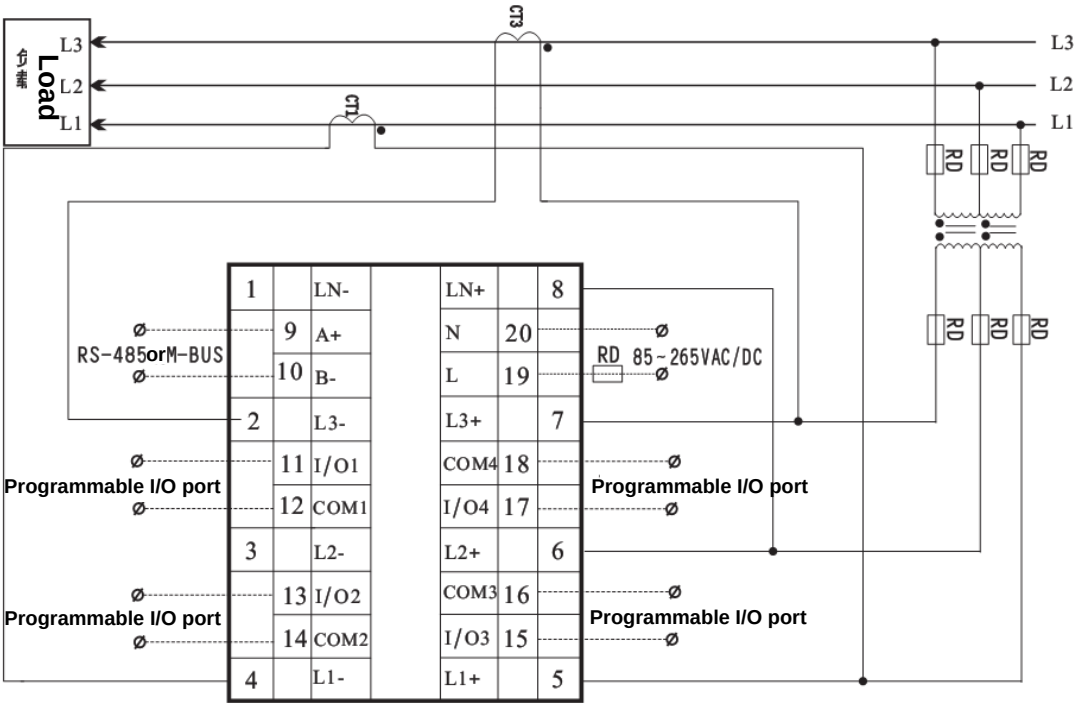


Fig. 5 3P3W with PT/CT Wiring Diagram

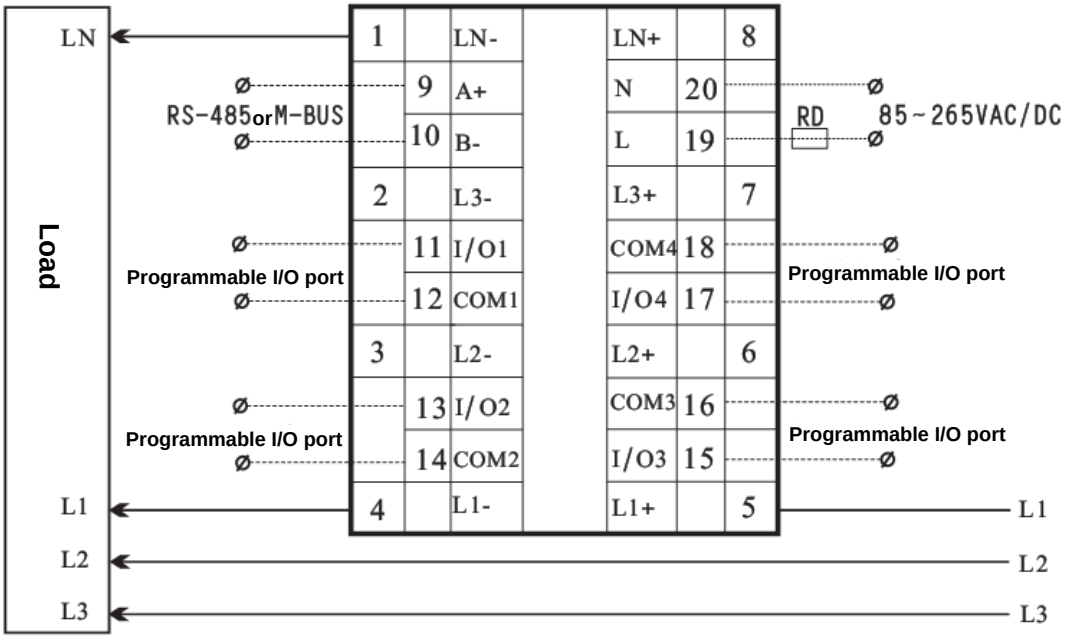
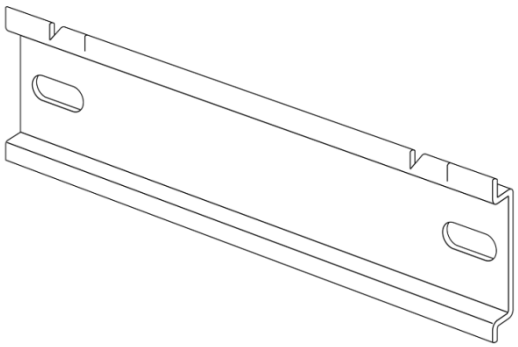


Fig. 6Single phase Wiring Diagram

10. Installation

1. Size: 126mm×89mm×74mm;
2. Installation structure: standard 35mm Din-rail installation, as shown in the following picture:

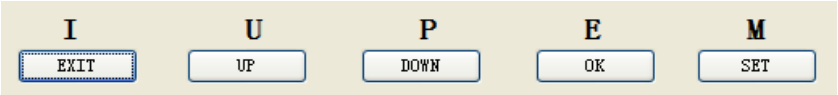


Mount the above rail on thecabinet first, and then buckle the back of meter on the rail.

11.Interface

11.1 Button introduction:

ARZ-5D has 5 buttons, as shown in the following image:



The functions of buttons are as follows:

Key mode	Query interface, Scroll display interface	Menu
I EXIT	Current queryshortcuts: toggle to current display interface quickly.	Back button: back to previous menu
U UP	Voltage queryshortcuts: toggle to voltage display interface quickly	Up button: toggle to previous menu or add input number.
P DOWN	Power queryshortcuts: toggle to power display interface quickly	Down button: toggle to previous menu or minus input number.
E OK	Energy queryshortcuts: toggle to energy display interface quickly	OK button, to confirm to toggle next menu or confirm the present input
M SET long press	Mode selection button: Long press the button for 3s and enter to menu	Mode selection button: Long press the button for 3s and enter to scroll display interface.
M SET Short press	Force to jump to scroll display interface from query interface	Move 1 bit cursor backward to modify numeral data.
I+UCombination	Lock/unlock button: after locking, the data on scroll display interface will stop, and the interface will be frozen; the query interface cannot be scrolled back to display interface automatically, and it will be scrolled back when pressing M button. After unlocking, it can worknormally.	No
I+PCombination	No	Reset button: only valid in menu setting. The reset need password, after confirmation, meter will reset all system register data.

Note: Long pressing M button for 3scan switch between the interface of query, scroll display and menu. And any interface can be switched with long pressing M button for 3s.
Pressing any button will light the screen backlight, and the backlight will be off when no operation in 30s.

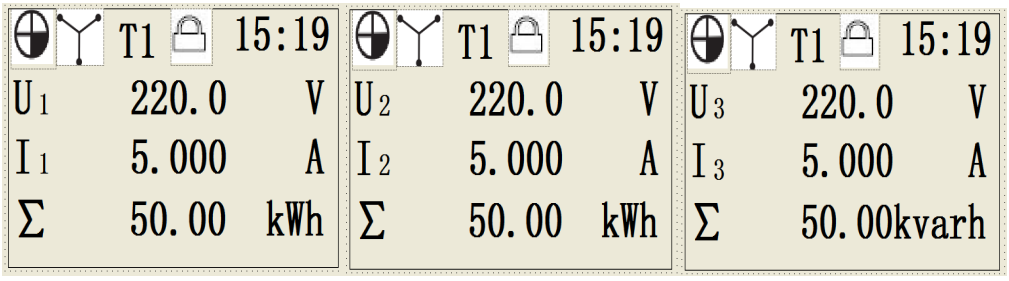
11.2 Display status introduction

Status icons are on the top of the screen. Status info includes power quadrant, wiring mode, screen lock status and system time. The details are as follows:

Status icon	Description
	Power quadrant
	Wiring mode, refer to 3P4W, 3P3W, 1P2W
T1，T2，T3，T4	Tariff interval
	Lock status: when locking, this icon displays, when unlocking, it disappears.
System time	Display the system time

11.3 Parameter scroll display mode

When poweringup, the meter will scroll displaying the interfaces. The scroll display mode has 6 interfaces; the interval among each interface is 3s. The main parameters in scroll display interface include phase voltage, line voltage, phase current, total energy, system status parameters and so on. As shown in the following images: (left to right, up to down)



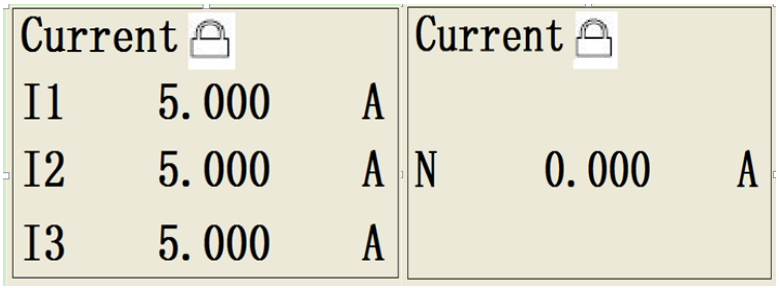
The display form of scroll display interface: The first line shows system status (power quadrant, wiring mode, multi-tariff, interface locking, and system time); the second line shows valid value of phase or line voltage; the third line shows valid value of phase current; and the forth line shows total input energy data (total active energy, total reactive energy, and total apparent energy).

In unlock state, the above 6 interfaces will display by turn in every 3s. In lock state, the interfaces will stop rolling and the present interface will be locked.
In scroll display interface, pressing any shortcuts (I, U, P, E) will enter query interface, and long pressing “M” button for 3s will enter menu.

11.4Parameter quick query mode:

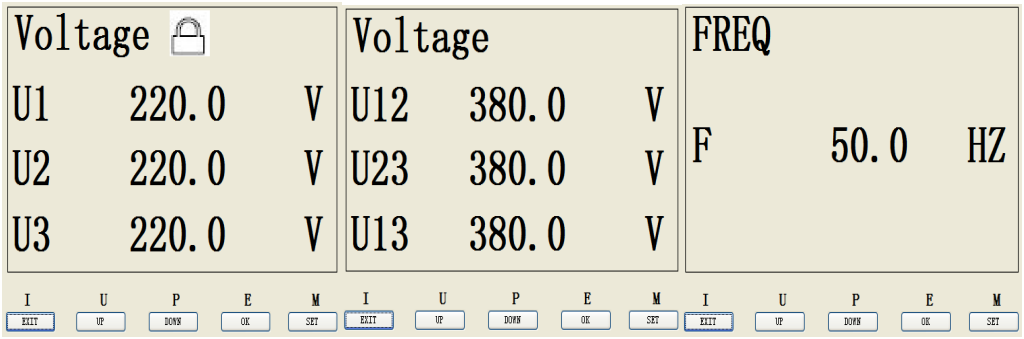
Quick query interface has 4 shortcut buttons, I, U, P, E. In scroll display or query interface, press any button to enter corresponded parameter query interface.

(1)Current quick query:
In scroll display or query interface, press I to enter the below display interface:



There are 2 interfaces to display Current data. The 2 interfaces can be switched by pressing I. Current quick display can show the 4 data: Phase A current, Phase B current, Phase C current, and Neutral current.

(2)Voltage quick query:
In scroll display or query interface, press U to enter the below display interface:



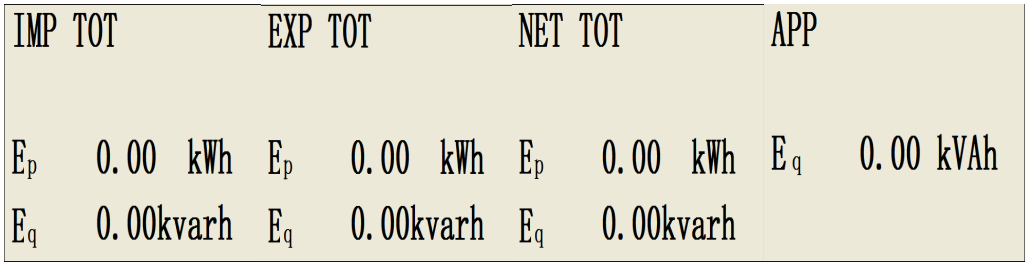
There are 3 interfaces to display Voltage data. The 3 interfaces can be switched by pressing U. Voltage quick display can show the data: Phase A voltage, Phase B voltage, Phase C voltage, Phase AB voltage, Phase BC voltage, Phase AC voltage and system frequency.

(3)Power quick query:
In scroll display or query interface, press P to enter the power quick display interface. There are 8 interfaces to display Power data. The 8 interfaces can be switched by pressing P. Power quick display can show the following data: Phase A active power, Phase B active power, Phase C active

power, total active power, Phase A reactive power, Phase B reactive power, Phase C reactive power, total reactive power, Phase A apparent power, Phase B apparent power, Phase C apparent power, total apparent power, Phase A power factor, Phase B power factor, Phase C power factor, total power factor.

(4) Energy quick query:

In scroll display or query interface, press E to enter the below display interface:



There are 4 interfaces to display Voltage data. The 4 interfaces can be switched by pressing E.

The first interface shows imported energy, the second shows exported energy, the third shows net energy and the forth shows total apparent energy. The following data can be displayed: total imported active energy, total imported reactive energy, total exported active energy, total exported reactive energy, total net active energy, total net reactive energy, and total apparent energy.

Note: In unlock state, enter quick query mode, when there's no operation for 30s, the interface will back to scroll display mode; In lock state, the interface will not switched automatically, and pressing M can back to scroll display interface. In query mode, long press M for 3s to enter Menu.

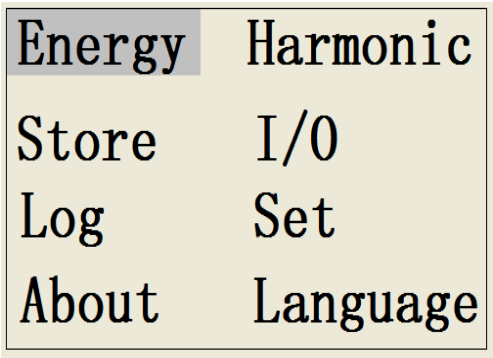
11.5 Menu interface

Menu mode is used for checking the detail parameters, data record, system information and system parameter configuration. The sub menus are as follows:

Main Menu	Sub Menu	Introduction
Energy	**Total**	Total imported energy, total exported energy, total net energy
	Phase	Imported, exported and net energy in each phase
	Tariff	Imported/exported total active/reactive energy in T1, T2, T3, T4
	Quadrant	Total active energy, total reactive energy of Q1, QA, Q3, Q4.
Harmonic	**U-THD**	Total Voltage harmonic distortion in each phase, Voltage odd/even distortion
	U-HAR	Voltage harmonic content of 63 times harmonic in each phase, each Voltage harmonic phase angle.
	I-THD	Total Current harmonic distortion in each phase, Current odd/even distortion

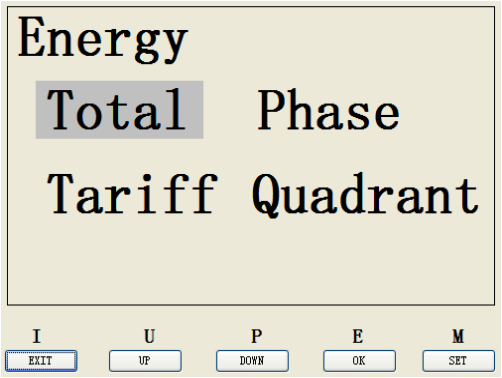
	I-HAR	Current harmonic content of 63 times harmonic in each phase, each Current harmonic phase angle.
	Fund	Fundamental content of voltage, current, active power, reactive power, apparent power
Store	**Demand**	Max. 50 channels recorded data are available to check. Each channel has 200 Demand records.
	Load Profile	Max. 16 channels recorded data are available to check. Each channel has the curve record of 2000data.
	Previous Value	Max. 50 channels recorded data are available to check. Each channel has 200 Energy records.
I/O	**I/O1**	I/O1 port function and status
	I/O2	I/O2 port function and status
	I/O3	I/O3 port function and status
	I/O4	I/O4 port function and status
Log	**System**	System log mainly record the hardware faults, power on log, setting change log and so on. Max. 500 system records are available to check.
	Event	Record the event relative alarm and configuration alarm. Max. 500 event records are available to check.
	Quality	Record the event alarm of power quality fault, max. 500 quality logs are available to check.
Set	**System**	Include the set of system clock, wiring mode, ratio, tariff, communication, and storage mode.
	I/O	Include the configuration of pulse output, alarm output, and status input detection
	Reset	Include the clearing of energy data, data record, log, I/O port count and reset all data.
	Store	Include the set of Demand storage, load curve storage, and energy record storage.
	Password	Set user password and administrator password
About	Hardware version	
	Date and time	
	Meter total running time	
Language	Chinese	
	English	

In scroll display or query interface, long press M for 3s to enter menu interface as following image:



(1) Energy query interface

After entering Menu, press “UP” or “DOWN” to move cursor, select “Energy” in main menu and press OK to enter sub menu, as the below image:



Energy data include: total energy data, phase energy data, tariff energy data and quadrant energy data.

The “Total” in energy query interface includes 4 sub interfaces; the contents of each interface are as follows:

1/4	Total import active energy, Total import reactive energy
2/4	Total export active energy, Total export reactive energy
3/4	Total net active energy, Total net reactive energy
4/4	Total apparent energy

The “Phase”includes 7 sub interfaces; the contents of each interface are as follows:

1/7	Phase A import active energy, Phase B import active energy, Phase C import active energy
2/7	Phase A import reactive energy, Phase B import reactive energy, Phase C import reactive energy
3/7	Phase A export active energy, Phase B export active energy, Phase C export active energy
4/7	Phase A export reactive energy, Phase B export reactive energy, Phase C export reactive energy
5/7	Phase A net active energy, Phase B net active energy, Phase C net active energy

6/7	Phase A net reactive energy, Phase B net reactive energy, Phase C net reactive energy
7/7	Phase A apparent energy, Phase B apparent energy, Phase C apparent energy

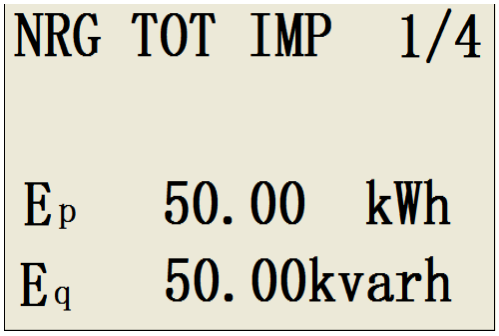
The “Tariff”includes8 sub interfaces; the contents of each interface are as follows:

1/8	Tariff1import total active energy, Tariff2 import total active energy, Tariff3 import total active energy
2/8	Tariff4import total active energy
3/8	Tariff1export total active energy, Tariff2 export total active energy, Tariff3 export total active energy
4/8	Tariff4 export total active energy
5/8	Tariff1 import total reactive energy, Tariff2 import total reactive energy, Tariff3 import total reactive energy
6/8	Tariff4 import total reactive energy
7/8	Tariff1 export total reactive energy, Tariff2 export total reactive energy, Tariff3 export total reactive energy
8/8	Tariff4 export total reactive energy

The “Quadrant”includes8 sub interfaces; the contents of each interface are as follows:

1/8	Q1 Tariff1 reactive energy, Q1 Tariff2 reactive energy, Q1 Tariff3 reactive energy
2/8	Q1 Tariff4 reactive energy, Q1 total reactive energy
3/8	Q2Tariff1 reactive energy, Q2Tariff2 reactive energy, Q2Tariff3 reactive energy
4/8	Q2Tariff4 reactive energy, Q2 total reactive energy
5/8	Q3Tariff1 reactive energy, Q3Tariff2 reactive energy, Q3Tariff3 reactive energy
6/8	Q3Tariff4 reactive energy, Q3 total reactive energy
7/8	Q4Tariff1 reactive energy, Q4Tariff2 reactive energy, Q4Tariff3 reactive energy
8/8	Q4Tariff4 reactive energy, Q4 total reactive energy

The display of energy data:

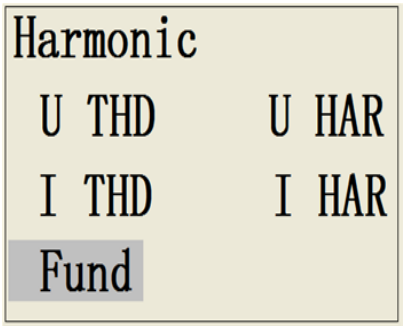


The first line of above interface shows the general property and the page number. “NRG TOT IMP” on above image refers to total imported energy. 1/4 refers to the first page of 4 pages. The

third and forth lines show the total active energy and total reactive energy. The interfaces of other type energy are similar with this one.

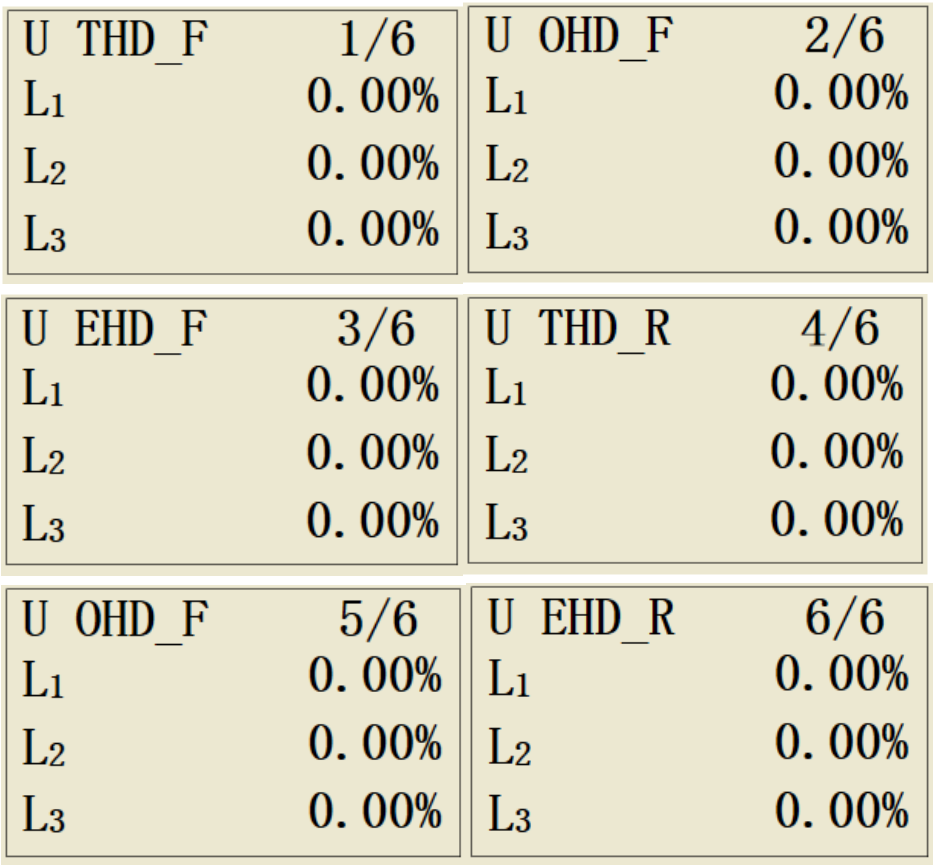
(2)Harmonic query interface

After entering Menu, press “UP” or “DOWN” to move cursor, select “Harmonic” in main menu and press OK to enter sub menu, as the below image:



Harmonic data include Voltage harmonic distortion, Current harmonic distortion, Voltage harmonic content, Current harmonic content and fundamental content.

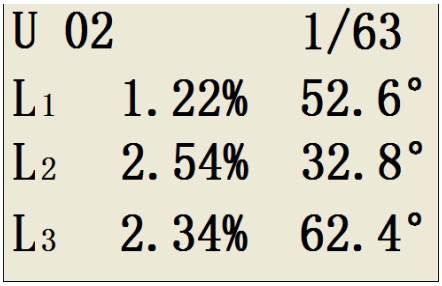
The sub menu “U THD” includes 6 interfaces: L1, L2, L3 Voltage total harmonic distortion based on Fundamental; L1, L2, L3 Voltage odd harmonic distortion based on Fundamental; L1, L2, L3 Voltage even harmonic distortion based on Fundamental; L1, L2, L3 Voltage total harmonic distortion based on RMS; L1, L2, L3 Voltage odd harmonic distortion based on RMS; L1, L2, L3 Voltage even harmonic distortion based on RMS.



The display form of harmonic distortion:
First line shows general property and the page number
Second line shows Phase A Voltage harmonic distortion
Third line shows Phase B Voltage harmonic distortion
Forth line shows Phase C Voltage harmonic distortion

The sub menu “I THD” includes 6 interfaces: L1, L2, L3 Current total harmonic distortion based on Fundamental; L1, L2, L3 Current odd harmonic distortion based on Fundamental, L1, L2, L3 Current even harmonic distortion based on Fundamental; L1, L2, L3 Current total harmonic distortion based on RMS; L1, L2, L3 Current odd harmonic distortion based on RMS; L1, L2, L3 Current even harmonic distortion based on RMS

The sub menu “U HAR” includes 62 interfaces which display the each Voltage harmonic content from the 2nd to 63rd.Each interface shows the 1, L2, L3 Voltage harmonic content and phase angle.



The above image shows the second voltage harmonic content and phase angle of L1, L2, L3.

As the above image, the first line shows harmonic times and page, U refers to Voltage harmonic; 02 refers to the second harmonic.
The second line shows L1 voltage harmonic content and phase angle
The third line shows L2 voltage harmonic content and phase angle
The forth line shows L3 voltage harmonic content and phase angle

“I HAR” includes 62 interfaces which display the each Current harmonic content from the 2nd to 63rd.Each interface shows the 1, L2, L3 Current harmonic content and phase angle. The display forms of harmonic content are the same as “U HTD”.

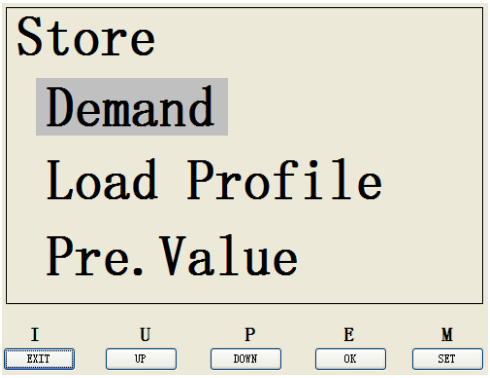
Fundamental content menu “Fund” include 5 interfaces, which show Voltage fundamental content of each phase, Voltagefundamental phase angle, Current fundamental content, Current fundamental phase angle, fundamental active power, fundamental reactive power, fundamental apparent power. The parameters of each interface are as follows:

1/5	Voltage fundamental content of Phase A/B/C fundamental phase angle, total 6 data
2/5	Current fundamental content of Phase A/B/C fundamental phase angle, total 6 data
3/5	Phase A fundamental active power, Phase B fundamental active power, Phase C fundamental active power

4/5	Phase A fundamental reactive power, Phase B fundamental reactive power, Phase C fundamental reactive power
5/5	Phase A fundamental apparent power, Phase B fundamental apparent power, Phase C fundamental apparent power

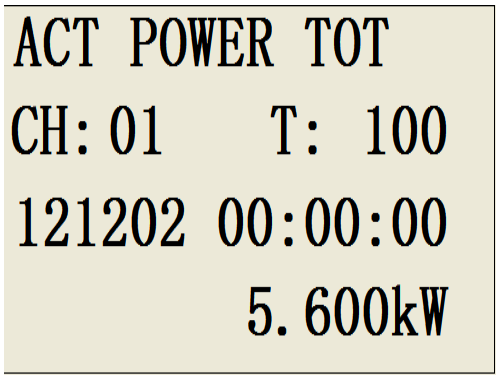
(3) Data record query interface:

After entering Menu, press "UP" or "DOWN" to move cursor, select "Store" in main menu and press OK to enter sub menu, as the below image:



The data record query include demand record query, load curve record query, energy record query.

In "Demand" menu, the user can check the recorded demand value of different parameters in each channel. Max. 50 channels recorded data are available to check and each channel can record max.200 records. The following image shows the demand query interface:



Interface description:

The first line shows the parameter name recorded by the current demand channel.

The second line shows the present channel number and the demand record number of this channel. The channel number and record number can be modified by pressing "UP""DOWN" button. "M" button is used to move the digital cursor. When modifying the channel and record number, the demand record display will be refreshed. "CH" refers to channel number; "T" refers to the record number of this channel.

The third line shows the date and time of the present demand record.

The forth line shows the recorded demand data

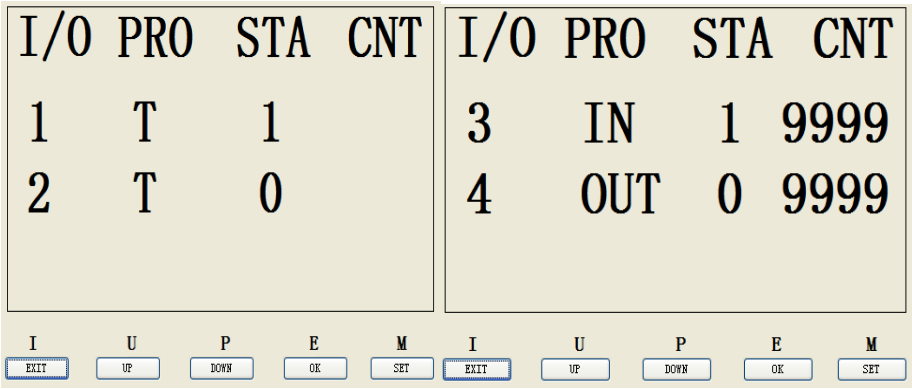
In Load curve record "Load Profile" menu, the user can check the record point data of each curve. Max. 16 channels load curve are available to check. Every channel can record max. 2000 data. Only the data of each record point can be checked thru screen, the screen can't support curve

drawing function. The curve can be drawn by software after collecting load curve data. The load curve data query interface is the same with demand query interface.

In energy frozen data record menu “Previous Value”, the user can check Max. 50 channels energy frozen data and each channel can record max.200 energy data. The energy data storage period is “day”“week”“month”. The energy data record display interface is the same with demand query interface.

(4) I/O port status query interface:

In the menu interface, press “UP” or “DOWN” to move cursor, select “I/O” in main menu and press OK to enter sub menu. Thru the I/O port status query function, the user can check 4 programmable I/O ports configuration, property andstatusinformation. I/O port status query has 2 interfaces, and each interface can display 2 I/O ports status information.



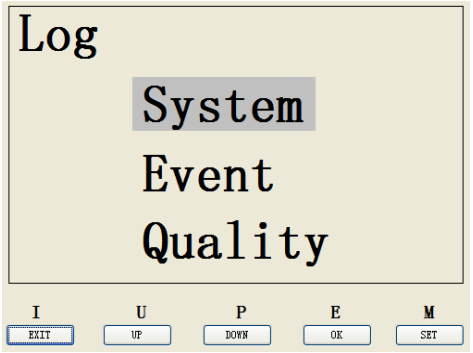
Interface description:

The first line shows the property of the present interface. I/O port refer to the I/O port number 1, 2, 3, 4. “PRO” means Profile, refers to the present I/O port property. There are 4 types of I/O port properties: Pulse output “Pulse”, Alarm output “Alarm”, Multi tariff input “Tari” and Status input “Sta”. “STA” refers to the power level state, which will not show when the pulse output. “CNT” refers to the counting number of alarm output and status input. Pulse output and multi tariff input have no “CNT” property.

The second and third lines show the property data of 2 I/O port.

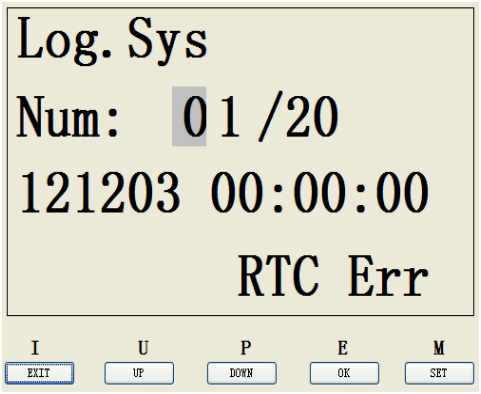
(5)Log query interface:

After entering Menu, press “UP” or “DOWN” to move cursor, select “Log” in main menu and press OK to enter log query interface:



Log record includes “System” system log, “Event” event log and “Quality” power quality log. The system log is mandatory, the event will be recorded once it triggered. Event log and power quality log are relative with data alarm, which means all vector parameters of the two logs are from alarm vector parameters, the trigger log should be opened in alarm setting.

System log menu: “System” mainly record system firmware failure, power off log, power on log and setting changes log. Max. 500 system logs are available to check. System log is mandatory. The query interface is as follows:



Interface description:

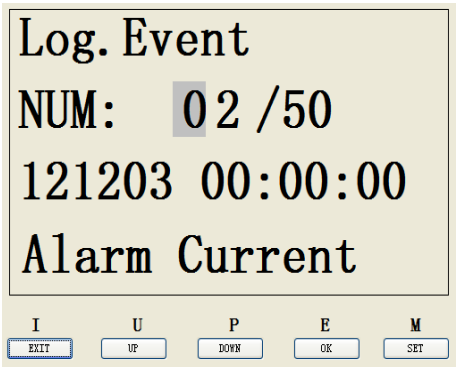
The first line shows the path of present interface;

The second line shows log number, the max. value is 500 system logs.

The third line shows date and time of present system log.

The forth line shows the triggering event info.

Event log menu: “Event” mainly records the relative alarm and configuration info. Event log is relative with alarm. The system will check the present alarm state and log to enable state of alarm channel and then record event log. The query interface is as follows:



Interface description:

The first line shows the path of present interface;

The second line shows log number, the max. value is 500 system logs.

The third line shows date and time of present system log.

The forth line shows the triggering event info.

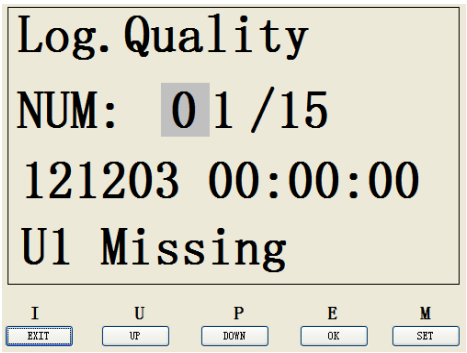
The factors of generating event log are as the following:

RTC didn’t	Neutral line current alarm	Total apparent power

configuredate		alarm
RTC didn't configure date	Total active power alarm	Phase A apparent power alarm
Phase A negative power alarm	Phase A active power alarm	Phase B apparent power alarm
Phase B negative power alarm	Phase B active power alarm	Phase C apparent power alarm
Phase C negative power alarm	Phase C active power alarm	Total power factor alarm
Total negative power alarm	Total reactive power alarm	Phase A power factor alarm
Phase A current alarm	Phase A reactive power alarm	Phase B power factor alarm
Phase B current alarm	Phase B reactive power alarm	Phase C power factor alarm
Phase C current alarm	Phase C reactive power alarm	

Note: If the user wants to record event log of above parameter, pls start the alarm function of this parameters. The log record function of alarm function can be started in alarm setting.

Power quality log menu "Quality" mainly records power quality failure event. Power quality log is relative with alarm. The system will check the present alarm state and log to enable the state of alarm channel and then record power quality log. The query interface is as the following:



Interface description:

The first line shows the path of present interface;

The second line shows log number, the max. value is 500 system logs.

The third line shows date and time of present system log.

The forth line shows the triggering power quality log info.

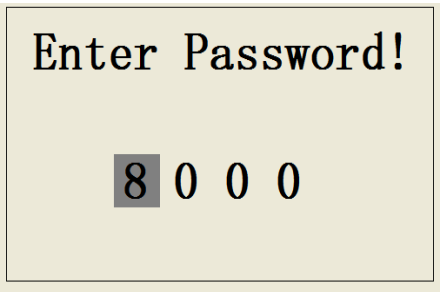
The factors of generating power quality log are as follows:

Phase A Voltage lack of phase	Phase A Voltage alarm	Phase BC Voltage alarm	Phase C Voltage harmonic content alarm
B Voltage lack of phase	Phase B Voltage alarm	Phase AC Voltage alarm	Phase AB Voltage harmonic content alarm
Phase C Voltage lack of phase	Phase C Voltage alarm	Phase A Voltage harmonic content alarm	Phase BC Voltage harmonic content alarm
Frequency unstable	Phase AB Voltage alarm	Phase B Voltage harmonic content alarm	Phase AC Voltage harmonic content alarm

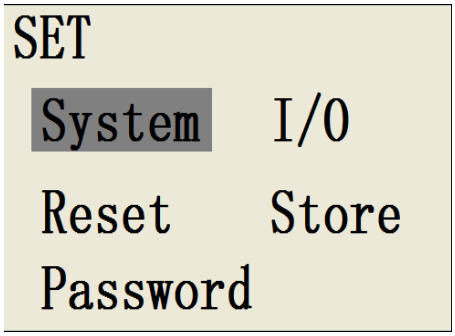
Note: If the user wants to record quality log of above parameter, pls start the alarm function of this parameters. The log record function of alarm function can be started in alarm setting.

(6) Parameter setting interface

After entering Menu, press “UP” or “DOWN” to move cursor, select “Set” in main menu and press OK to enter password input interface, as the below image:

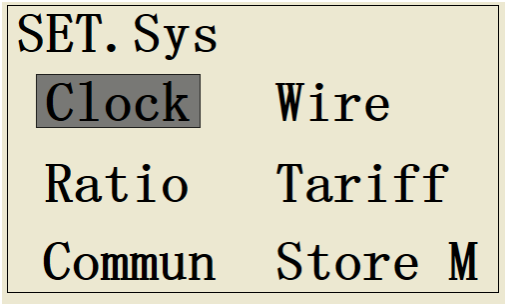


The main password includes 4 numbers, “UP”“DOWN” button can change number, “M” button can move the cursor. After inputting right password and press OK to enter sub menu.



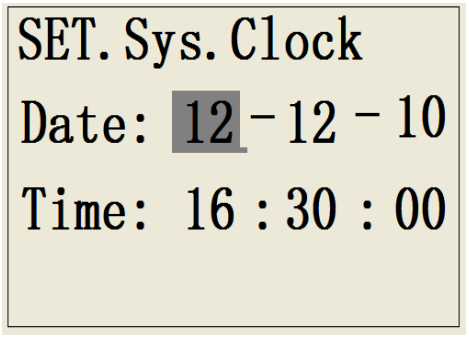
Main menu of the settings includes: “System” system parameters setting, “I/O” programmable I/O port setting, “Reset” data rest setting, “Store” data storage setting, “Password” user password and administer password setting.

"System" system parameter setting menu: Set/ system, sub menu is as follows":



System parameter setting includes: "Clock" clock setting, "Wire" wire mode setting, "Ratio" ratio setting, "Tariff" tariff setting, "Commu" communication setting, and "Store M" data storage mode setting.

Clock setting, select "Set/ System/ Clock" menu and enter clock setting interface.



Interface description:

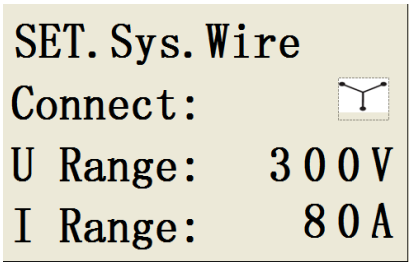
The first line shows the path of present interface;

The second line shows date setting. 12-12-10 refers to 10th, Dec., 2012.

The third line shows time setting.

"UP""DOWN" button can change data, "M" button can move cursor, after finishing data setting, press OK to confirm, and then back to previous menu.

Wiring mode setting, select "Set/ System/ Clock" menu and enter clock setting interface.



Interface description:

The first line shows the path of present interface;

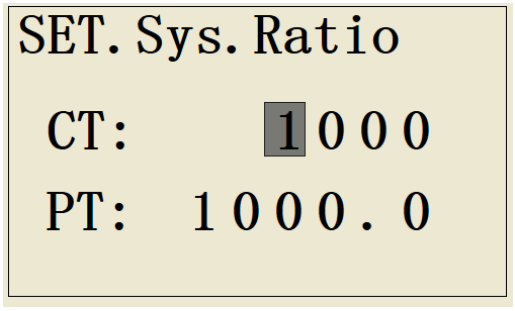
The second lone shows wiring mode setting, means 3P4W, means 3P3W, means 1P2W.

The third line shows Voltage range setting, the range is 0-400V (Phase voltage)

The forth line shows Current range setting, the range is 0-80A.

"UP""DOWN" button can change data, "M" button can move cursor, after finishing data setting, press OK to confirm, and then back to previous menu.

Ratio setting, select "Set/ System/ Clock" menu and enter clock setting interface.



Interface description:

The first line shows the path of present interface;

The second line shows Current CT ratio setting, the range is 1~9999:1

The third line shows Voltage PT ratio setting, the range is 1.0~9999.9:1

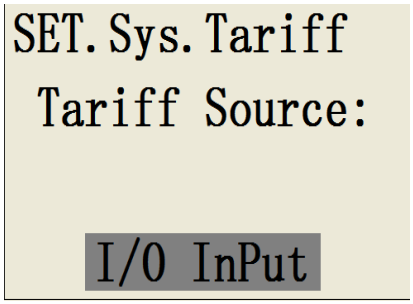
"UP""DOWN" button can change data, "M" button can move cursor, after finishing data setting, press OK to confirm, and then back to previous menu.

Tariff setting, select "Set/ System/ Clock" menu and enter Tariff setting interface.

Tariff setting steps:

1. Select tariff source (I/O port input, software communication, calendar)
2. Configure the corresponding parameters according to different tariff source.

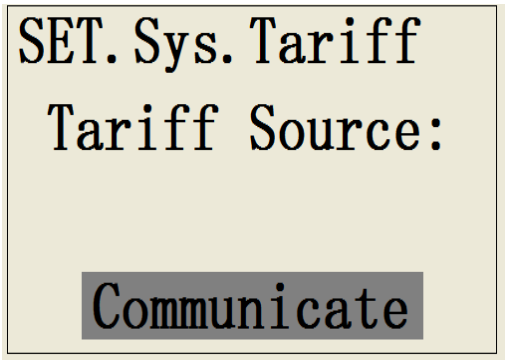
1). Select I/O port input as tariff source（Set/System/Tariff/InPut）:



Select I/O InPut as tariff source, and confirm with OK button. If I/O1 and I/O2 are occupied at the same time, then the selection failed and then there will be a hint "no available I/O port". The I/O port can be released by setting from I/O port setting interface.

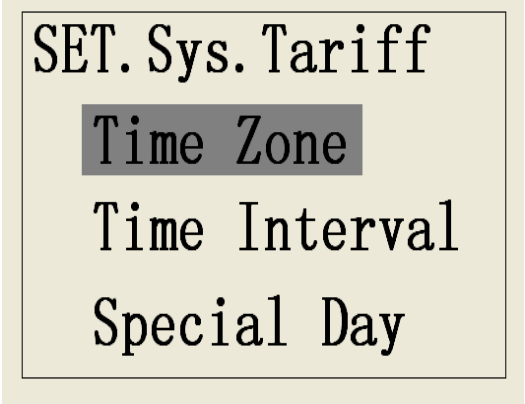
When I/O port available, press OK to confirm, and there will be a hint "Tariff source setting successful". Then the tariff clock will measure tariff energy according to power level variation of I/O port.

2).Select software communication as tariff source（Set/System/Tariff/InPut）:



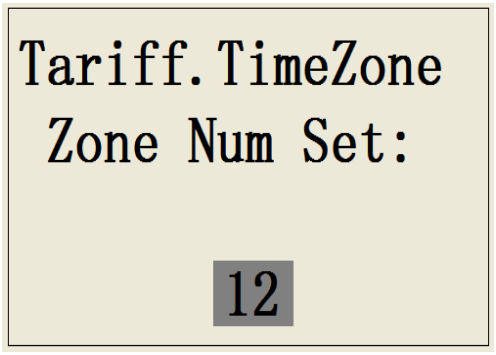
When selecting software communication as tariff source, the tariff time will be totally controlled by communication software and all parameters also will be treated by software. The software will control the meter to choose tariff type.
Press OK to confirm and back to previous menu.

3) Select calendar as tariff source (Set/System/Tariff/InPut):



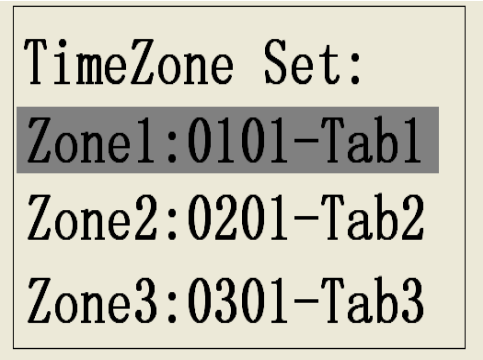
Tariff calendar can set the following parameters: “Time Zone”, “Time Interval”, and “Special Day”.
The meter can set 12 time zones, the start time and the time interval in this time zone can be set. There are 8 time tabs to be chosen, one day (24 hours) can be divided into 12 intervals, the start time and tariff of each time interval can be set. The meter can set at most 254 special days, every time date can use 1 time tab. The special date is in the priority than the time zone.

Time Zone setting: (Time zone)
First, the time zone numbers should be set. The max. number could be 12.

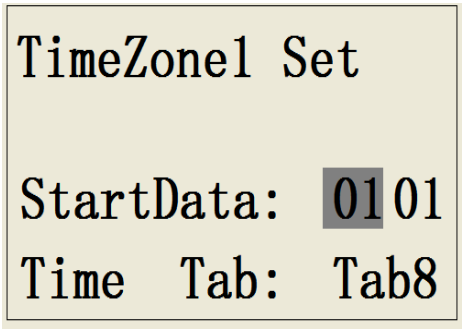


Use “UP” “DOWN” to select time zone number and press OK to confirm. Then the following

menu will be popped up.

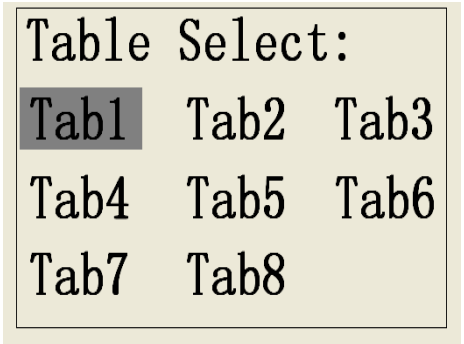


The display time zone numbers are relative with the set number. The user set 4 time zones, then 4 configurable zones will display as above image. If this page is full, it will display on next page.
Time zone display format: time zone serial number, time zone start date and the used time tab. For example: Zone 1:0101-Tab1 means the first zone, and start date is January 1st, this time zone use Tab1.
If the user needs to modify time zone, pls choose the time zone number and press OK to enter the setting interface.

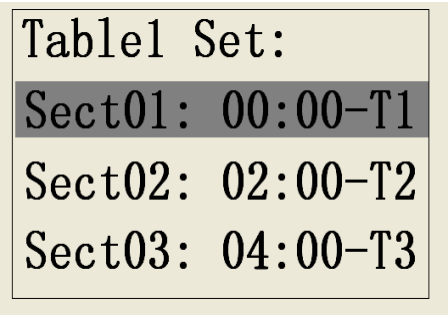


In this page, the user can set both start time and corresponded time tab. The principle of start time setting: The start date of first zone should be the ending date of the last zone. The start time of behind zone should be the ending time of former zone. When the start time of current zone exceeds other behind zone, then the time will be changed as start time of former zone + 15 days. (Use “UP”“DOWN” to increase or reduce, “M” to move cursor). After finishing setting, press OK to confirm and then back to previous menu.

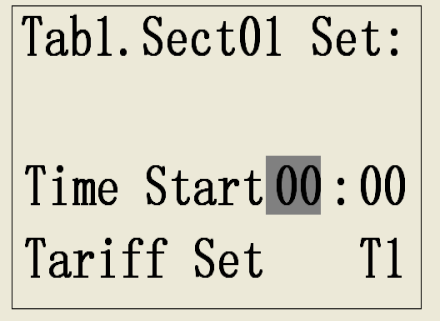
Time Interval setting: (Time Interval)
Enter to time interval setting, there will be 8 tabs for selection.



Select the tab which needs to be changed and press OK to enter.
Each Tab can be divided as 12 sections. The time length and tariff of each section can be set asfollows:

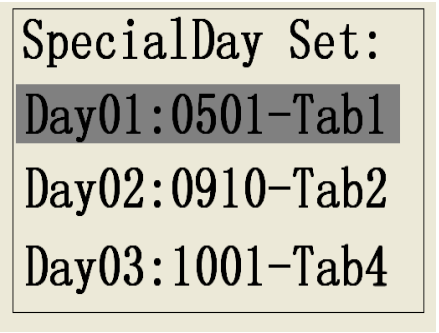


Time table setting format: time section serial number, time section start date and tariff. For example: Sect01: 00:00-T1 means the start time of first section is 00 clock 00 minute, and the tariff of this section is T1.
Select the section which needs to be modified and press OK to enter the following interface:



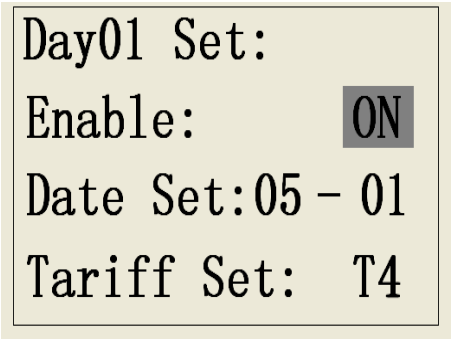
In this page, the user can set both start time and the corresponding tariff. The principle of time section setting: The start date of current section should be the ending date of the former section. When the start time of current section exceeds other time section, then the start time of exceeded section will be changed as start time of former section + 15 days. After finishing setting, press OK to confirm and then back to previous menu.

Special Day setting: (Special Day)
Special day means that the user can set some days to use special time tables, the max. number can be 254 days.
Special day display format: special day serial number, special day date and the time table used for special day. For example: Day01:0501-Tab1 means the special day date is May 1st, and use Table 1 on this day.



The unused special day is displayed as 0000-00. For example: Day03:0000-00 means the third

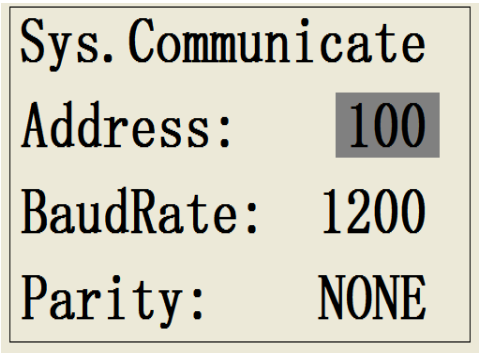
special is unused.
Select the special day serial number which needs to be modified or added, and press OK to enter the following interface:



In the setting interface, the user can set: enable, date, and tariff. After finishing setting, press OK to confirm and then back to previous menu.

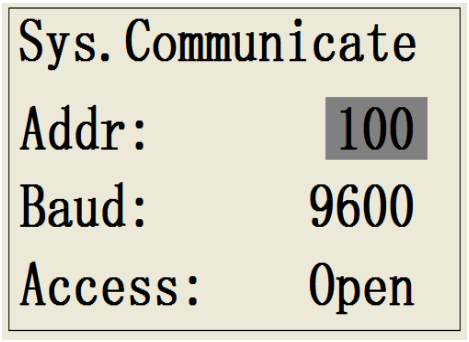
Communication setting: select “Set/ System/ Clock” menu and enter communication interface. The meter has two communication ways: RS-485 or M-BUS. For different type, the setting is different. These two communication ways share one output port.

1） RS-485 communication setting:
RS-485 communication setting include: Address, baud rate and parity bit.



Interface description:
The first line shows the path of present interface;
The second line shows address setting, the range is 1~255.
The third line shows baud rate, 1200, 2400, 4800, 9600, 19200 bps are available to choose.
The forth line shows the parity setting, the user can choose odd, even or no parity.

2） M-BUS communication setting:
M-BUS communication setting include: Address, baud rate and Access.



Interface description:

The first line shows the path of present interface;

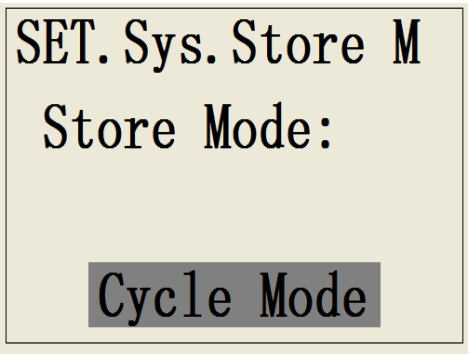
The second line shows address setting, the range is 1~255.

The third line shows baud rate, 300, 600, 1200, 2400, 4800, 9600 bps are available to choose

The forth line shows the access, the user can choose open, close or set password.

Data storage mode setting（Set/System/Store M）

In storage mode setting, the user can set storage mode of system data record and log record. There're 2 types: "Cycle mode" and "linear mode".

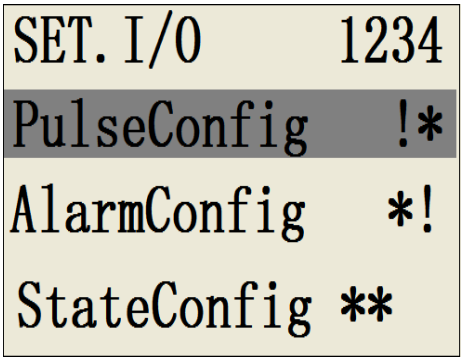


Cycle mode: when storage space is full, the new data will cover the old data, and start to store from the first data.

Linear mode: when storage space is full, the storage function will stop.

After chosen storage mode, press OK to confirm, and then back to previous menu.

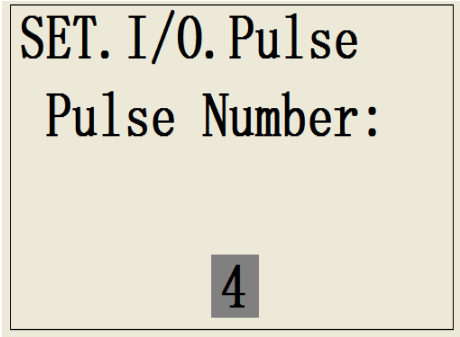
Programmable I/O port setting menu: (Set / I/O), sub menu as below:



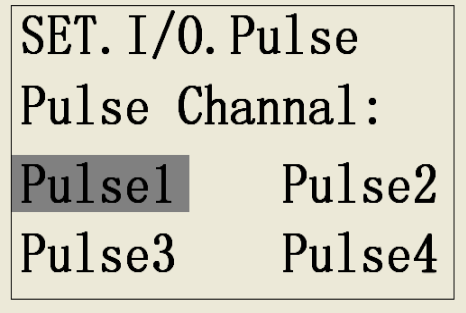
Programmable I/O port configuration includes: Pulse config., Alarm config., and state config. The

first line shows the corresponding I/O port. “!” means I/O port occupied, and “*” means I/O port available.

Pulse configuration:(Set/ I/O/PulseConfig)
Setting steps:
1. Enter pulse configuration sub menu, the default is the present pulse number. If the user wants to modify, pls press “UP”“DOWN” button. The pulse number can’t exceed the available I/O port and the max. set is 4 pulses. When pulse number is 0, the pulse output function is forbidden.

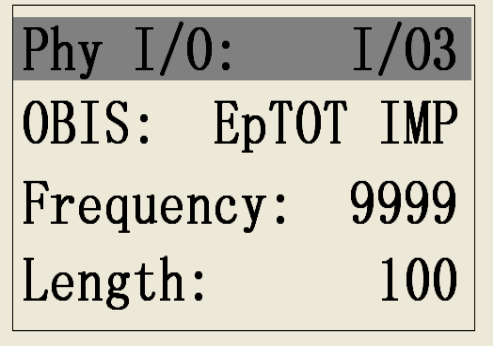


Press “UP”“DOWN” button to change pulse number, and press OK to confirm. Then the pulse channel will be shown:



The pulse channel display is relative with the pulse number setting on previous page. When the setting is 1 pulse output, the interface will only show Pulse1.

2. Select the pulse channel which needs to be configured and press OK to enter parameter configuration interface:



Pulse parameters configuration include: Physical I/O port, pulse carrier parameters OBIS, pulse constant, pulse width.
Parameter names display on the left and the present set values are on the right. Select the

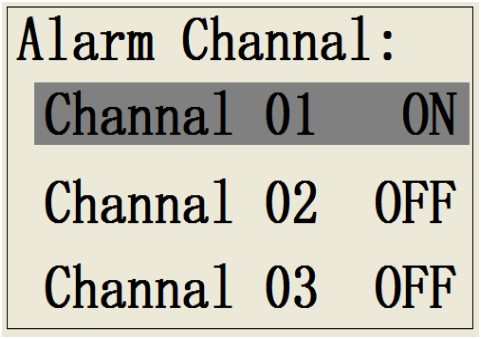
parameter which needs to be configured and press OK to enter configuration interface. And then select the suitable parameter and press OK to go back to the previous menu.
Enter “”Phy I/O”, the available I/O port will display, and the occupied ones will not.

“OBIS” parameters include the following 5 type:

1.Imported total active energy
2.Exported total active energy
3.Imported total reactive energy
4. Exported total reactive energy
5.Inactive

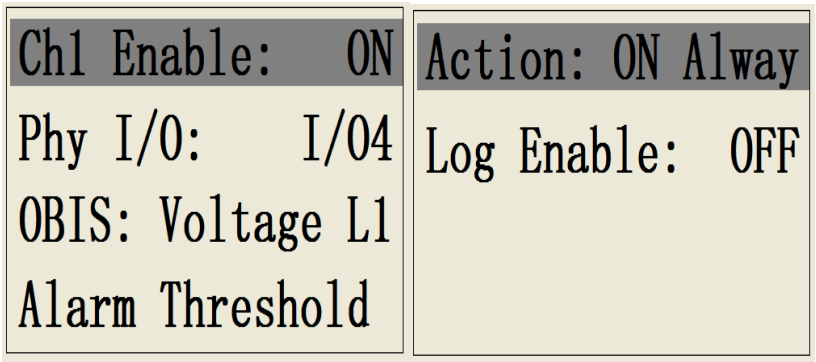
OBSI select Inactive means pulse output is closed.

Alarm configuration (Set/ I/O/AlarmConfig)
Setting step:
1. Enter alarm configuration sub menu, there’s 25 alarm channels for selection. The 25 channels display on several pages:



Alarm channel display format: Channel serial number + enable state. For example: Channel01 ON means Alarm channel 1 is in enable active state. Channel02 OFF means Channel 2 is in closed state. Alarm channel enable state is used to explain if the channel available. Alarm parameter setting needs to enter sub menu.

2. Select the channel serial number which needs to be modified or added, and then press OK to enter sub menu:



Alarm parameter configuration includes 6 parameters which display on 2 pages: alarm channel

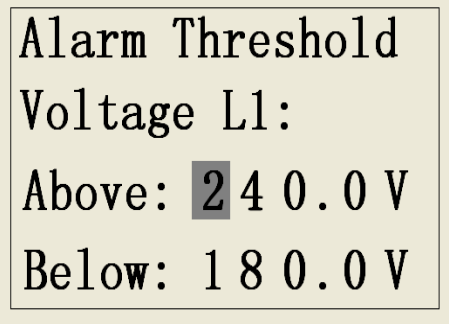
enable state, physical I/O port, carrier parameter OBIS, alarm parameter threshold, alarm action, alarm log enable.
Channel enable state can choose “ON” or “OFF” to open or close alarm function. When the present enable state changes, the enable state on previous menu will be updated.

3. Physical I/O port only can choose the available one. If the user wants to use occupied I/O port, the function on this port needs to be closed.

Alarm carrier parameter OBIS can choose the followings:

Phase A voltage	Phase C current	Phase B reactive power	Phase B power factor
Phase B voltage	Natural current	Phase C reactive power	Phase C power factor
Phase C voltage	Total active power	Total apparent power	Phase A voltage harmonic content
Phase AB voltage	Phase A active power	Phase A apparent power	Phase B voltage harmonic content
Phase BC voltage	Phase B active power	Phase B apparent power	Phase C voltage harmonic content
Phase AC voltage	Phase C active power	Phase C apparent power	Phase AB voltage harmonic content
Phase A current	Total active power	Total power factor	Phase BC voltage harmonic content
Phase B current	Phase A reactive power	Phase A power factor	Phase AC voltage harmonic content

4. The parameter setting values of alarm threshold will be different according to different OBIS. Some parameters have upper and lower alarm limit, but some parameters only have upper alarm limit. Threshold setting interface is as follows:



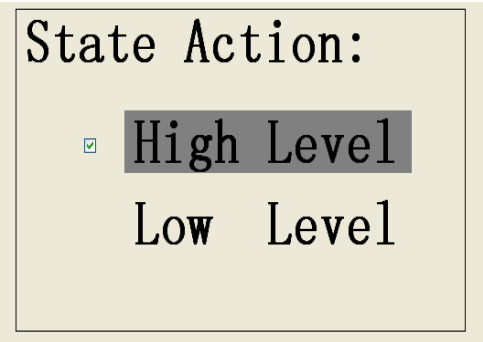
The second line shows the present alarm OBIS. The below shows upper and lower limited value. After finishing setting, press OK to go back to the previous menu.

5. Alarm action has 2 selections:
“ON Alway”: when not alarm, constant on; when alarm, constant off.
“OFF Alway”: when not alarm, constant off; when alarm, constant on.

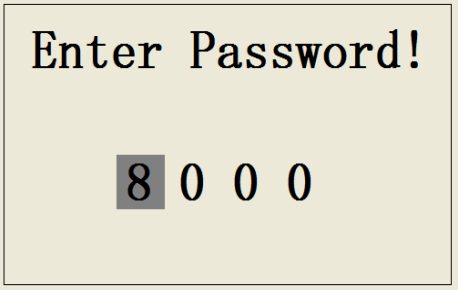
6. Alarm log enable: in active state, it will record an alarm log when meet alarm requirement. (Event log or power quality log)
Alarm function can count alarm times of each alarm I/O port. The alarm times can be checked in I/O port query menu.

State Action configuration (Set/ I/O/StateConfig)
State action is used to judge external state thru the high and old power level of I/O port input. State action and tariff input share I/O1, I/O2. But one I/O port only supports one function. When tariff input occupy both I/O1 and I/O2, the state action will not display.

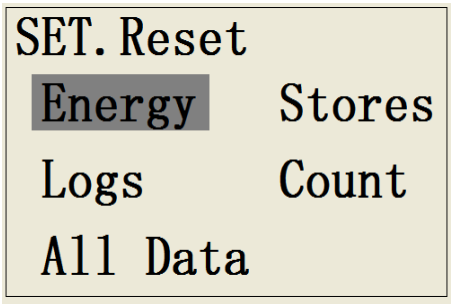
State action can set max. 2 channels. When setting is 0, it means no state action. State action includes: high level state action, low level state action.



"Reset" data clearing setting menu：Set/ Reset
Entering data reset interface needs to input secondary password first.



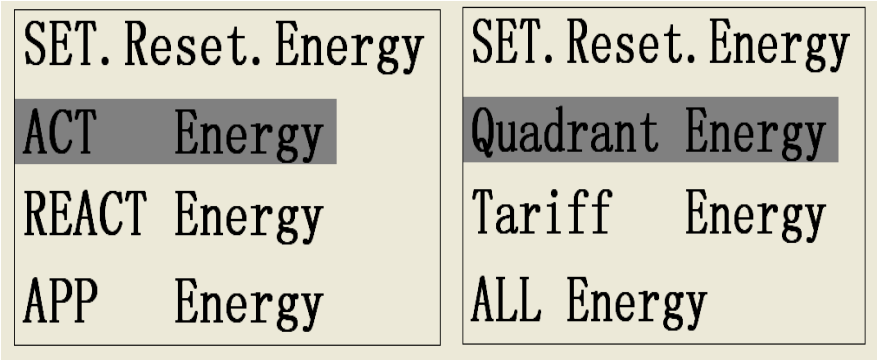
The input method of secondary password is the same with main password. Input the password and press OK to enter reset sub menu.



Data reset menu includes: "Energy" data reset, "Stores" data reset, "Logs" data reset, "Count" I/O port counting data reset, and "All Data" reset.

Energy reset (Set/Reset/Energy)

Entering energy reset sub menu, these parameters will be shown: active energy, reactive energy, apparent energy, quadrant energy, tariff energy and all energy.



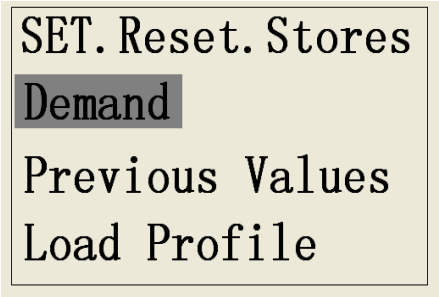
The above 6 types energy data include:

Energy parameters	Parameter detail
Imported active energy	Phase A/B/C imported active energy, total imported active energy
Exported active energy	Phase A/B/C exported active energy, total exported active energy
Imported reactive energy	Phase A/B/C imported reactive energy, total imported reactive energy
Exported reactive energy	Phase A/B/C exported reactive energy, total exported reactive energy
Imported apparent energy	Phase A/B/C imported apparent energy, total imported apparent energy
Exported apparent energy	Phase A/B/C exported apparent energy, total exported apparent energy
Tariff imported active energy	Total imported active energy Tariff1，Tariff2，Tariff3，Tariff4
Tariff exported active energy	Total exported active energy Tariff1，Tariff2，Tariff3，Tariff4
Tariff imported reactive energy	Total imported reactive energy Tariff1，Tariff2，Tariff3，Tariff4
Tariff exported reactive energy	Total exported reactive energy Tariff1，Tariff2，Tariff3，Tariff4
Net active energy	Phase A/B/C net active energy, total net active energy
Net reactive energy	Phase A/B/C net reactive energy, total net reactive energy
Net apparent energy	Phase A/B/C netapparent energy, total net apparentenergy

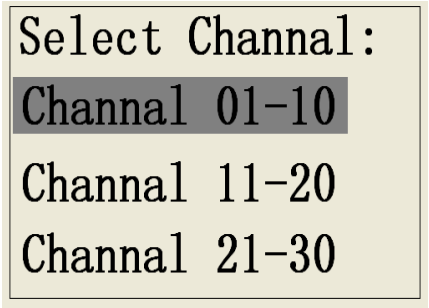
Quadrant 1 energy data	Quadrant 1 T1/T2/T3/T4 reactive energy, total reactive energy
Quadrant 2 energy data	Quadrant 2 T1/T2/T3/T4 reactive energy, total reactive energy
Quadrant 3 energy data	Quadrant 3 T1/T2/T3/T4 reactive energy, total reactive energy
Quadrant 4 energy data	Quadrant 4 T1/T2/T3/T4 reactive energy, total reactive energy

Energy reset mode: choose one type of energy, press OK to reset all the energy data of this type. Choose “All Data” to reset all the energy data.

Storage data reset（Set/Reset/Stores）
Enter storage date reset sub menu:

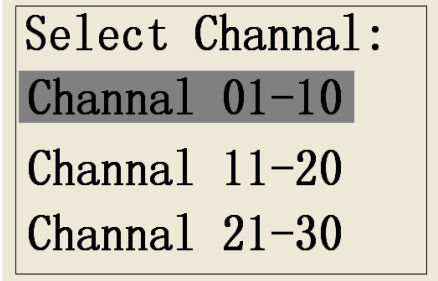


This interface has 3 reset items: Demand storage data reset, energy record data reset, load curve storage data reset.
1. Demand storage data reset: choose “Demand”, press OK to enter sub menu:



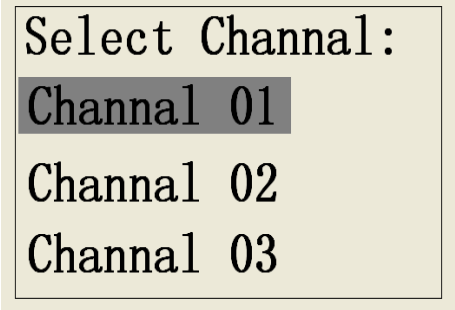
Demand storage has 50 channels, the data rest unit is channel. Choose the channel number can press OK to reset demand data.
For example: rest the demand of channel 15. First, choose channel 11-20 to enter sub menu and then choose channel 15 and press OK to reset. Choose Channel 01-50 means to reset all 50 channels data at the same time.

2. Frozen energy record reset: choose “Previous Value” and press OK to enter sub menu:



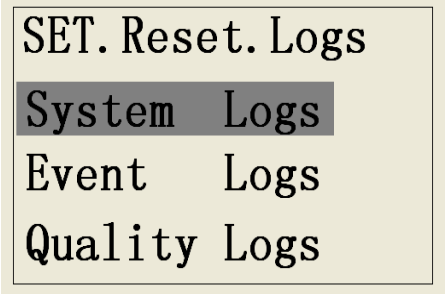
Energy frozen data storage has 50 channels, the data rest unit is channel. Choose the channel number can press OK to reset energy frozen data.
For example: rest the energy of channel 15. First, choose channel 11-20 to enter sub menu and then choose channel 15 and press OK to reset. Choose Channel 01-50 means reset all 50 channels data at the same time.

3. Load curve data reset: choose “Load Profile” and press OK to enter sub menu:



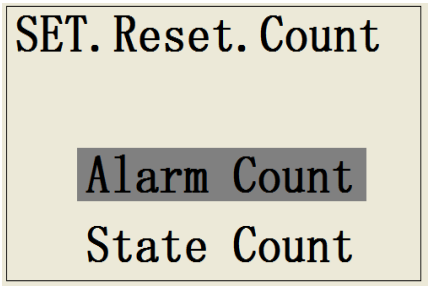
Load curve data storage has 16 channels, the data rest unit is channel. Choose the channel number can press OK to reset data.

Log record reset: (Set/Reset/Logs)



The interface includes: system log reset, event log reset, and power quality log reset. Log reset unit is type. Choose the log type and press OK to reset all log data of this type.

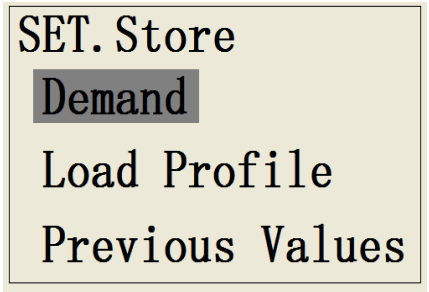
I/O port counting reset: (Set/Reset/Count)



Counting reset includes: Alarm counting reset, and state action counting reset. Choose the reset type, press OK to confirm and then back to the previous menu.

Choosing this type of reset will reset all the data and log record, including: energy data, data storage record, log record and I/O port counting.

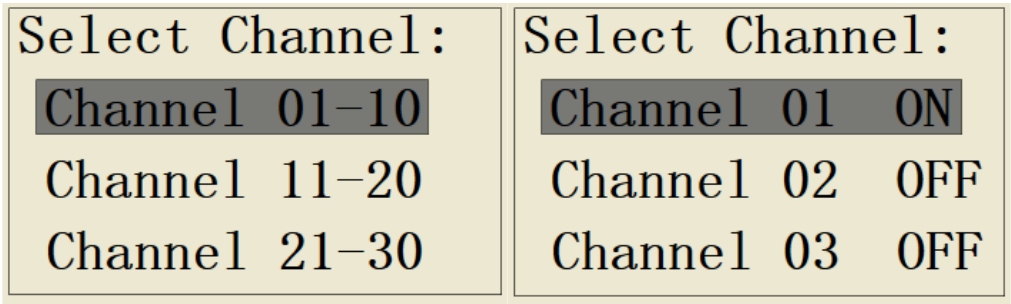
Data storage menu: Set / Store, shown as follows:



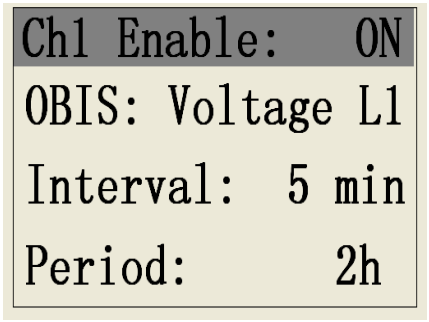
Data storage menu includes: “Demand”, “Load Profile”, and “Previous Values”.

Demand storage setting (Set/Stores/Demand)

Demand storage function can be configured max. 50 channels, the users can select the channel and press “OK” button to enter the parameter configuration interface. For example, if the user wants to configure the demand storage function in the third channel, pls select “channel 01-10” first, and then press “OK” to select “Channel 03” and then enter the setting interface.



The display format of the above interface: demand channel number + Channel enable switch. Select the channel number which needs to be modified or increased, press OK to enter the internal parameter setting interface.



In this interface, the user can set the following 4 parameters: enable setting, the corresponding carrier parameters OBIS of demand, the calculating time interval, and demand storage period.

OBIS carrier parameters can be selected from the data below :

Total imported active energy	Tariff 2 imported active energy	Phase BC voltage total harmonic content	Total reactive power
Phase A imported active energy	Multi-tariff 3 imported active energy	Phase AC voltage total harmonic content	Phase A reactive power
Phase B imported active energy	Multi-tariff 4 imported active energy	Phase A current	Phase B reactive power
Phase C imported active energy	Phase A voltage	Phase B current	Phase C reactive power
Total imported reactive energy	Phase B voltage	Phase B current	Total apparent power
Phase A imported reactive energy	Phase C voltage	Phase A current total harmonic content	Phase A apparent power
Phase B imported reactive energy	Phase AB voltage	Phase B current total harmonic content	Phase B apparent power
Phase C imported reactive energy	Phase BC voltage	Phase C current total harmonic content	Phase C apparent power
Total imported apparent energy	Phase AC voltage	Total active power	Pulse input count
Phase A imported apparent energy	Phase A voltage total harmonic content	Neutral line current harmonic content	Multi-tariff 1 imported reactive energy
Phase B imported apparent energy	Phase B voltage total harmonic content	Phase A active power	Multi-tariff 2 imported reactive energy
Phase C imported apparent energy	Phase C voltage total harmonic content	Phase B active power	Multi-tariff 3 imported reactive energy
Multi-tariff 1 input active energy	Phase AB voltage total harmonic content	Phase C active power	Multi-tariff 4 imported reactive energy

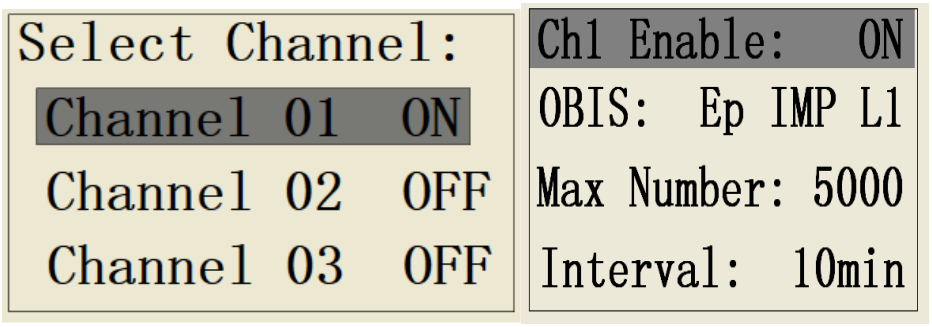
The calculating time interval of demand data: 1, 2, 5, 10, 15, 20, 30, 60, 120, 180, 240, 360, 480, 720, 1440 minutes

Period of demand data: 1H, 2H, 3H, 6H, 12H, 18H, 1 day, 1 week, 1 month.

Load curve storage setting: (Set/Stores/Load Profile)

Load curve can simultaneously or separately record 16 channels data parameters.

Select the channel and press “”OK”” button to enter the parameter setting interface



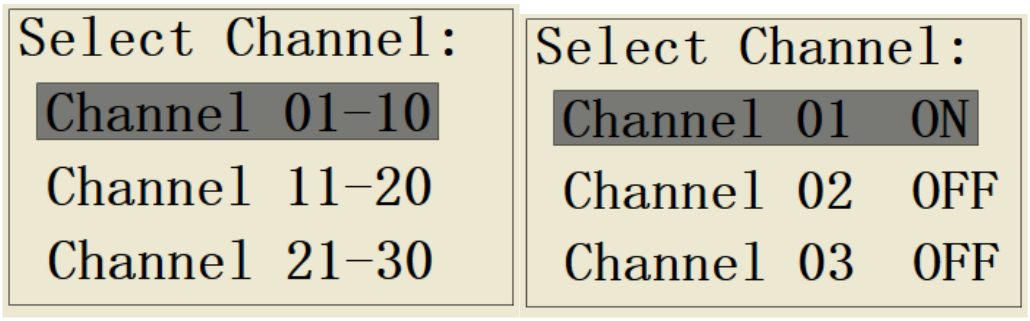
In this interface, the user can set the following 4 parameters: Enable state, the corresponding carrier parameters OBIS, the maximum storage data number, time interval.

Load curve can be selected from the following carrier parameters:

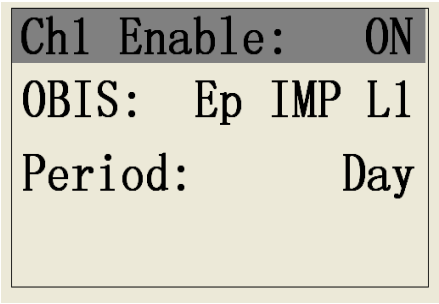
Total imported active energy	Phase A imported reactive energy	Phase C imported apparent energy	Phase BC voltage
Total exported active energy	Phase B imported reactive energy	Phase A exported apparent energy	Phase AC voltage
Phase A imported active energy	Phase C imported reactive energy	Phase B exported apparent energy	Phase A current
Phase B imported active energy	Phase A exported reactive energy	Phase C exported apparent energy	Phase B current
Phase C imported active energy	Phase B exported reactive energy	Active energy currency transform	Phase C current
Phase A exported active energy	Phase C exported reactive energy	Active energy C02 transform	Neutral current
Phase B exported active energy	Total imported apparent energy	Phase A voltage	Total power factor
Phase C exported active energy	Total exported apparent energy	Phase B voltage	Phase A power factor
Total imported reactive energy	Phase A imported apparent energy	Phase C voltage	Phase B power factor
Total output reactive energy	Phase B imported apparent energy	Phase AB voltage	Phase C power factor

The load curve data record of 16 channels can record 80000 data, and the maximum storage range of each channel is 0-5000.
The range of load curve data record interval is: 1, 2, 5, 10, 15, 20, 30, 60, 120, 180, 240, 360, 480, 720 or 1440 minutes.

Energy frozen record setting (Set/Stores/Previous Values)
Energy frozen data storage function can be configured maximum 50 channels, the users can select the channel and press “OK” button to enter the parameter configuration interface. For example, if the user wants to configure the energy frozen data storage function of the third channel, pls select “channel 01-10” first, then press “OK” button to select “Channel 03” to enter the setting interface.



The display format of the above interface: energy frozen channel number + Channel enable state. Select the channel which needs to be modified or increased, and press OK to enter the internal parameter setting interface.



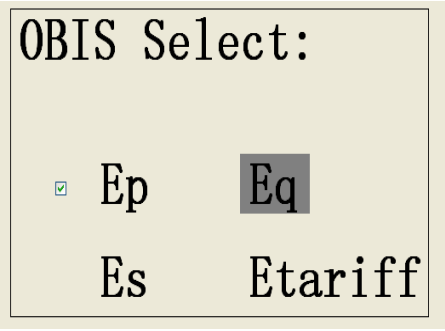
This interface can set the following 3 parameters: enable state; the corresponded carrier parameters of the energy frozen data, and energy frozen storage period.

Energy freeze can select from the following carrier parameters:

Total imported active energy	Phase C exported reactive energy	Multi-tariff 3 imported active energy	Phase A net active energy
Total output active energy	Total imported apparent energy	Multi-tariff 4 imported active energy	Phase B net active energy
Phase A imported active energy	Total exported apparent energy	Multi-tariff 1 imported reactive energy	Phase C net active energy
Phase A imported active energy	Phase A imported apparent energy	Multi-tariff 2 imported reactive energy	Total net reactive energy
Phase B imported	Phase B imported	Multi-tariff 3 imported	Phase A net reactive

active energy	apparent energy	reactive energy	energy
Phase A exported active energy	Phase C imported apparent energy	Multi-tariff 4 imported reactive energy	Phase B net reactive energy
Phase B exported active energy	Phase A exported apparent energy	Multi-tariff 1 exported active energy	Phase C net reactive energy
Phase C exported active energy	Phase B exported apparent energy	Multi-tariff 2 exported active energy	Total apparent energy
Total imported reactive energy	Phase C exported apparent energy	Multi-tariff 3 exported active energy	Phase A net apparent energy
Total exported reactive energy	Can reset total imported active energy	Multi-tariff 4 exported active energy	Phase B net apparent energy
Phase A imported reactive energy	Can reset total exported active energy	Multi-tariff 1 exported reactive energy	Phase C net apparent energy
Phase B imported reactive energy	Can reset total imported reactive energy	Multi-tariff 2 exported reactive energy	Active energy currency transform
Phase C imported reactive energy	Can reset total exported reactive energy	Multi-tariff 3 exported reactive energy	Active energy C02 transform
Phase A exported reactive energy	Multi-tariff 1 imported active energy	Multi-tariff 4 exported reactive energy	
Phase B exported reactive energy	Multi-tariff 2 imported active energy	Total net active energy	

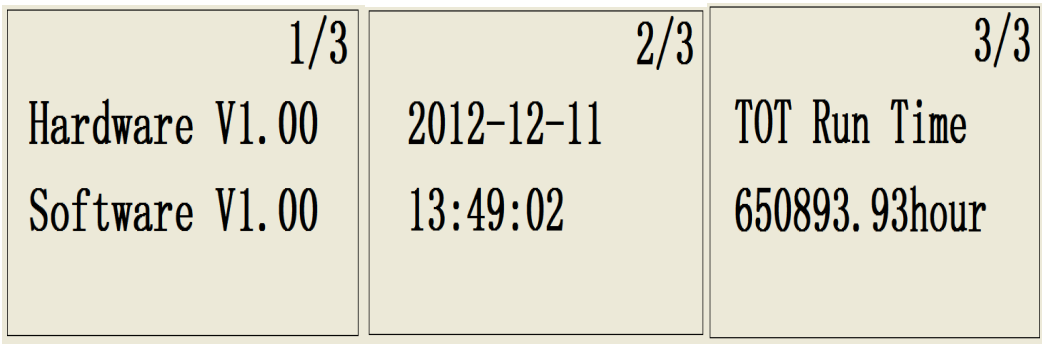
Above parameters can be divided into four types: active energy, reactive energy, apparent energy, multi-tariff energy.



Period of energy frozen storage: day, week, month.

（7）“About”

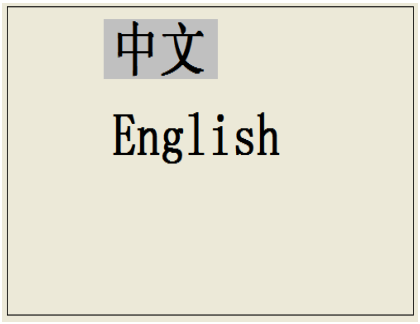
“About” menu is used to query the version number, date, time and total running time



Version number include the hardware version and software version of the meter;
Date and time display the real-time clock information of the current system;
Total running time is the meter total running time, and the unit is hour.

（8）“Language” setting

The meter supports two language display, “Chinese” and “English”, show as below:



II Software Description

1. Function Description

Thru the software, the user can remotely read ARZ-5D sampling data and set parameters, which include instantaneous parameter query, energy data query, harmonic analysis data query, I/O port status query, demand record data query and setting, load profile query and setting, energy frozen data query and setting, log record query, system parameters setting pulse setting, alarm setting, state action setting, reset setting, language setting and so on. Energy tariff function can support measuring the energy in any interval (min. interval is 15 minutes) and reading energy data of sum, sharp, peak, flat, valley. Harmonic function can support real-timeanalyzing 2nd ~63rd harmonics and displaying graphically. Load profile can support drawing function of record data.**If the user want to use RS-485 for remote communication, 120Ω resistance should be added on terminal.**

2. Software installation

(1) Software environment: Win9x, WinMe, Win2000/XP.
(2) Installation: Double click setup.exe, and follow the instruction step by step to install the software. Click English for the next step.

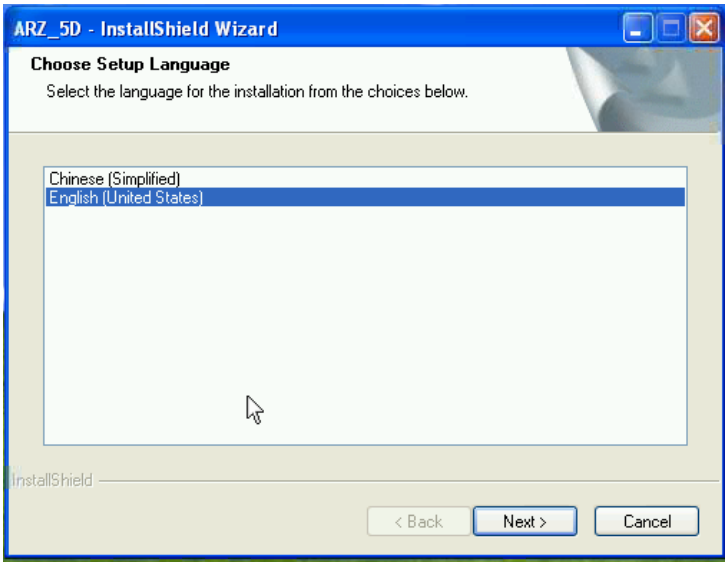


Fig.126 Choose setup language

(3) When the next page is shown, the installation in progress.

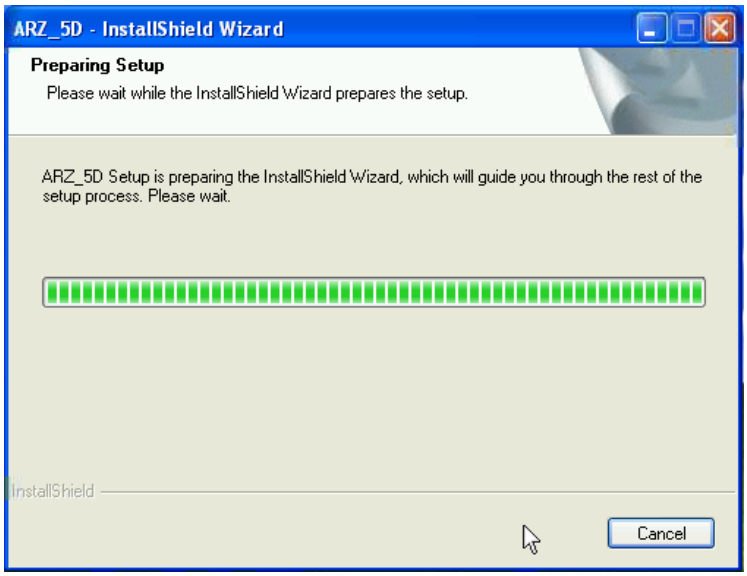


Fig. 127 Preparing setup

(4) When the page in Fig. 128 as shown, click "next", the Fig. 129 is shown.

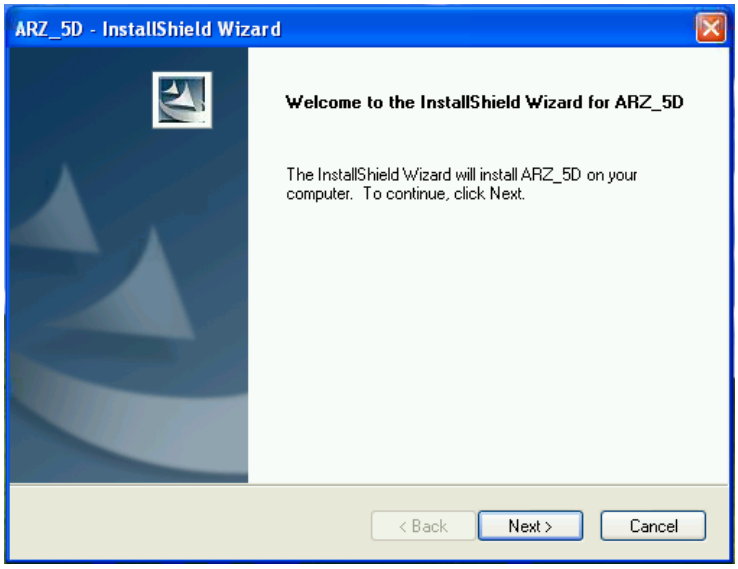


Fig. 128 Installation in progress

(5) If the user wants to change the destination file, click "change" to change it. Click "next" to continue installing software.

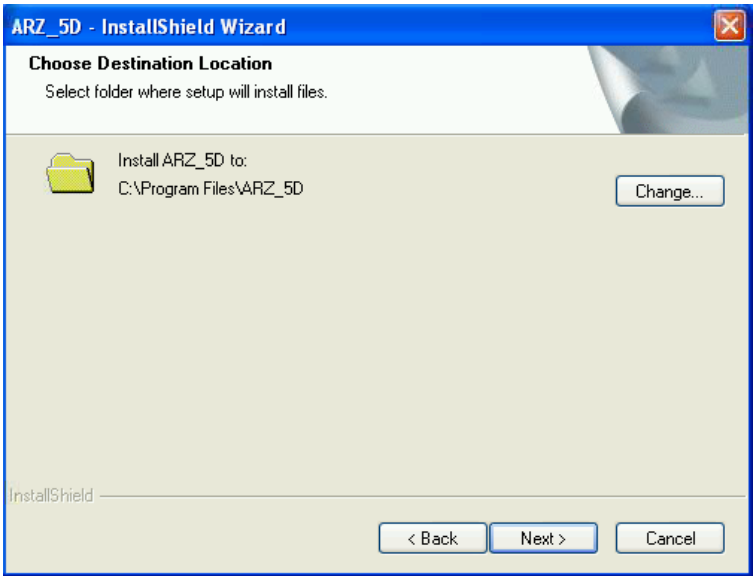


Fig. 129 Change installation path

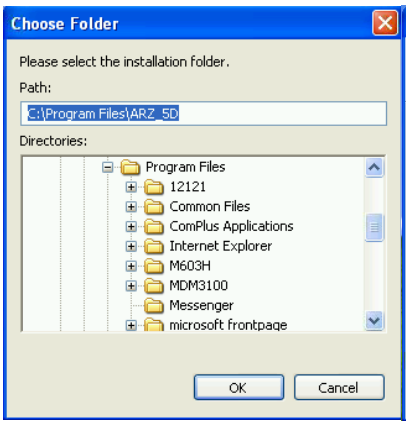


Fig. 130Choose folder

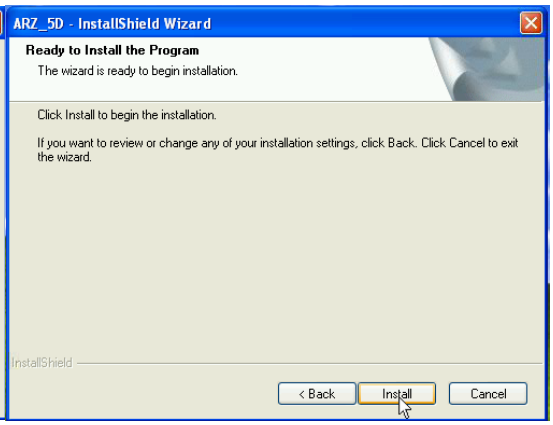


Fig.131 Change installation pathsuccessfully

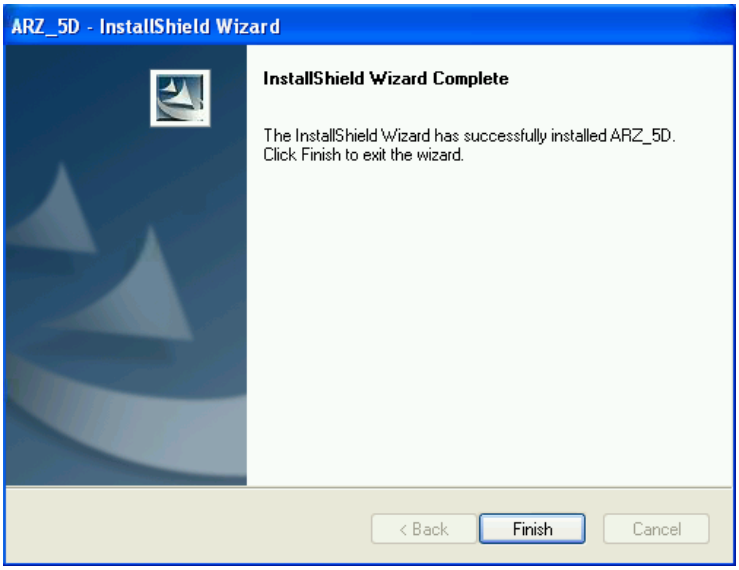


Fig. 133 Finish installation

Click "Finish" icon, the "ARZ-5D" icon shall appear on the desktop.

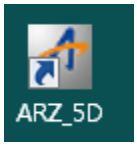


Fig. 134 Quick icon

3. Operation Page Setup

After the software installed, double click the 

icon to enter the following page as shown in Fig. 135 on PC. Choose the corresponding com. port and baud rate (choose COM1, 9600bps), click search button, the searching interface will pop up as Fig. 136.

The user can type the corresponding address as the setup on the meter (the default setting is 1).

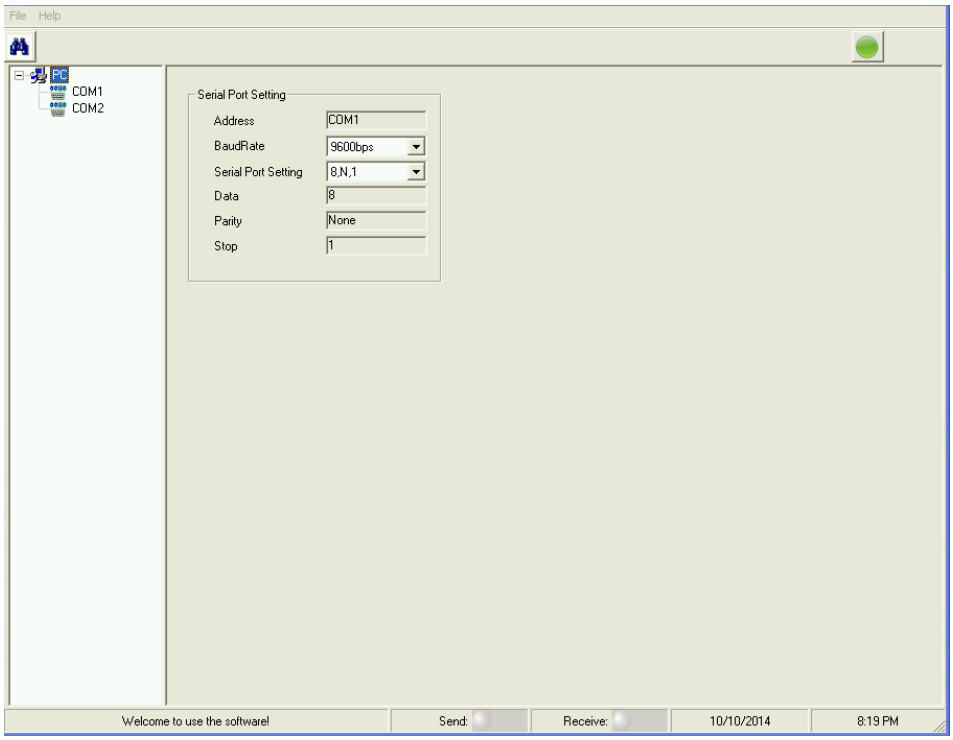


Fig. 135 Choose com. Number and baud rate

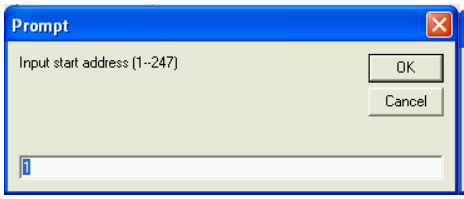


Fig.136 Input start address

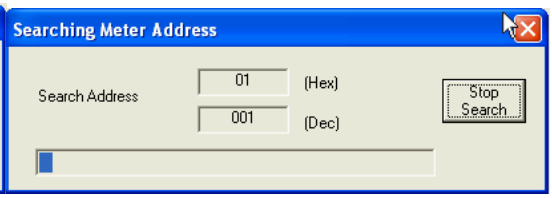


Fig. 137 Searching address

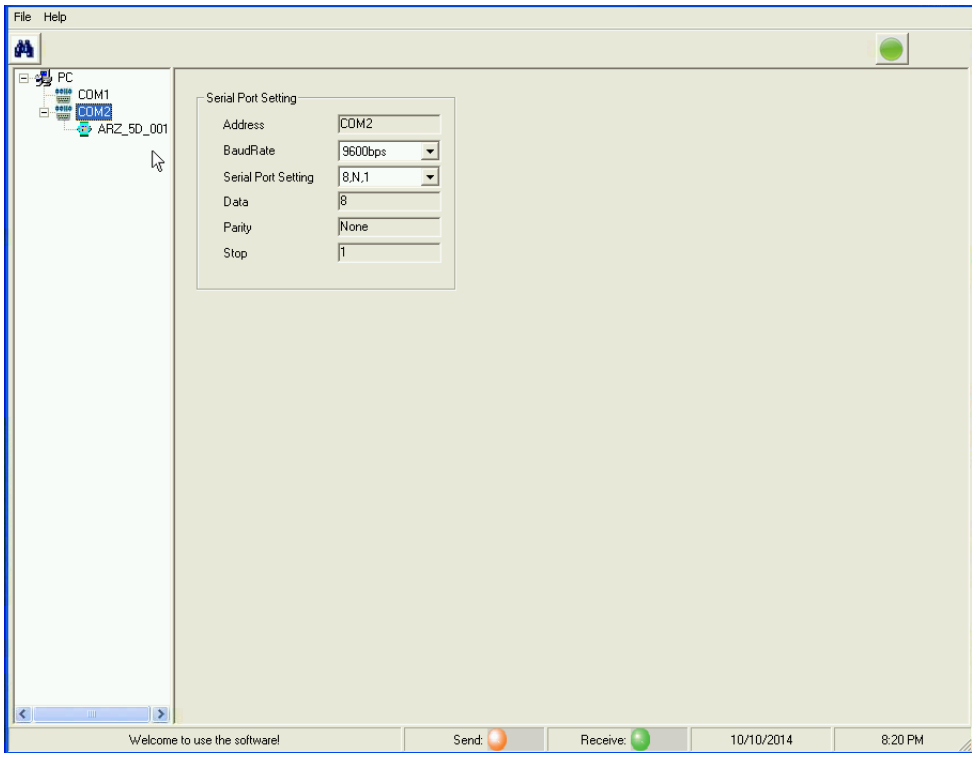
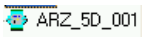


Fig. 138Meter is searched

After the meter is searched, click "stop" button. Meanwhile click the 

icon in the page and back to the page shown as Fig. 139.

4. Interfaces Description

As Fig. 139 shows, the measured data in 3P4W system are displayed (Fig. 140 shows 3P3W measured data). This interface displays the system configuration, measured data, quadrant energy and energy. System parameters include address, wiring mode, PT/CT enable, PT/CT value, baud rate, serial property, storage mode, language, date, time, protocol, running time, and so on. The measured data, quadrant energy and energy data are displayed on the interface as Fig. 139.

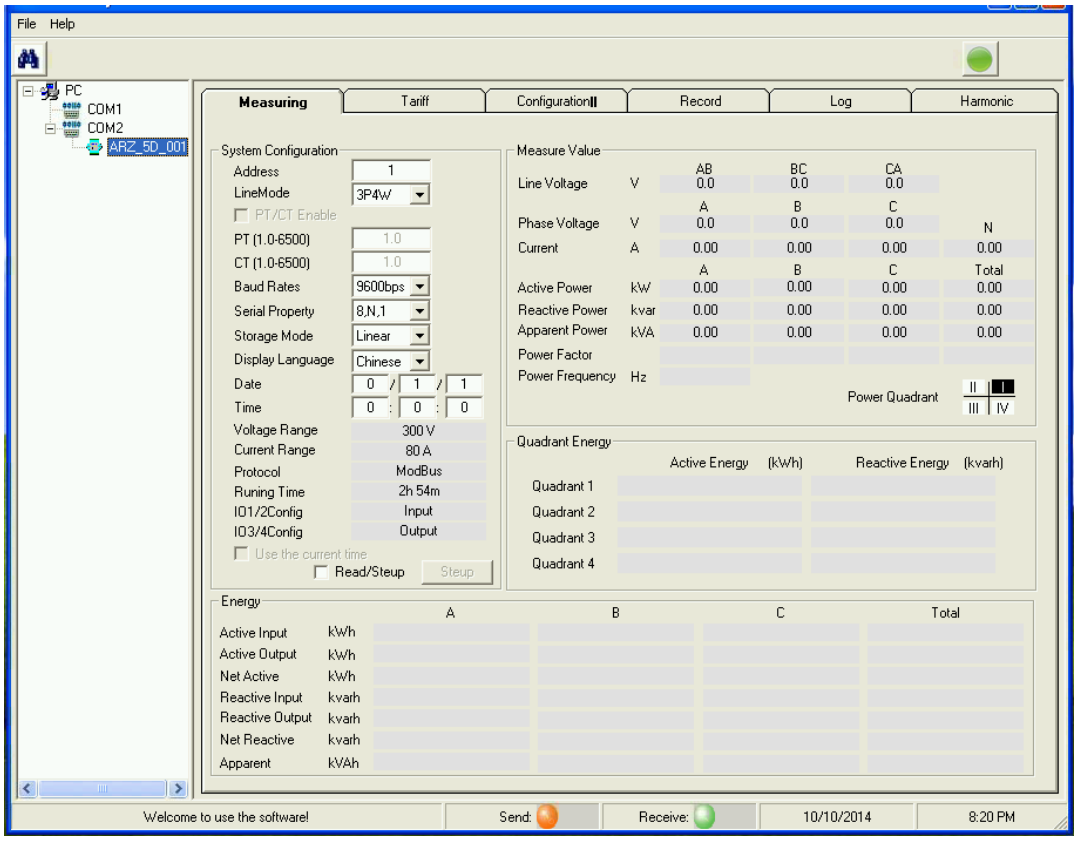


Fig. 139 3P4W display

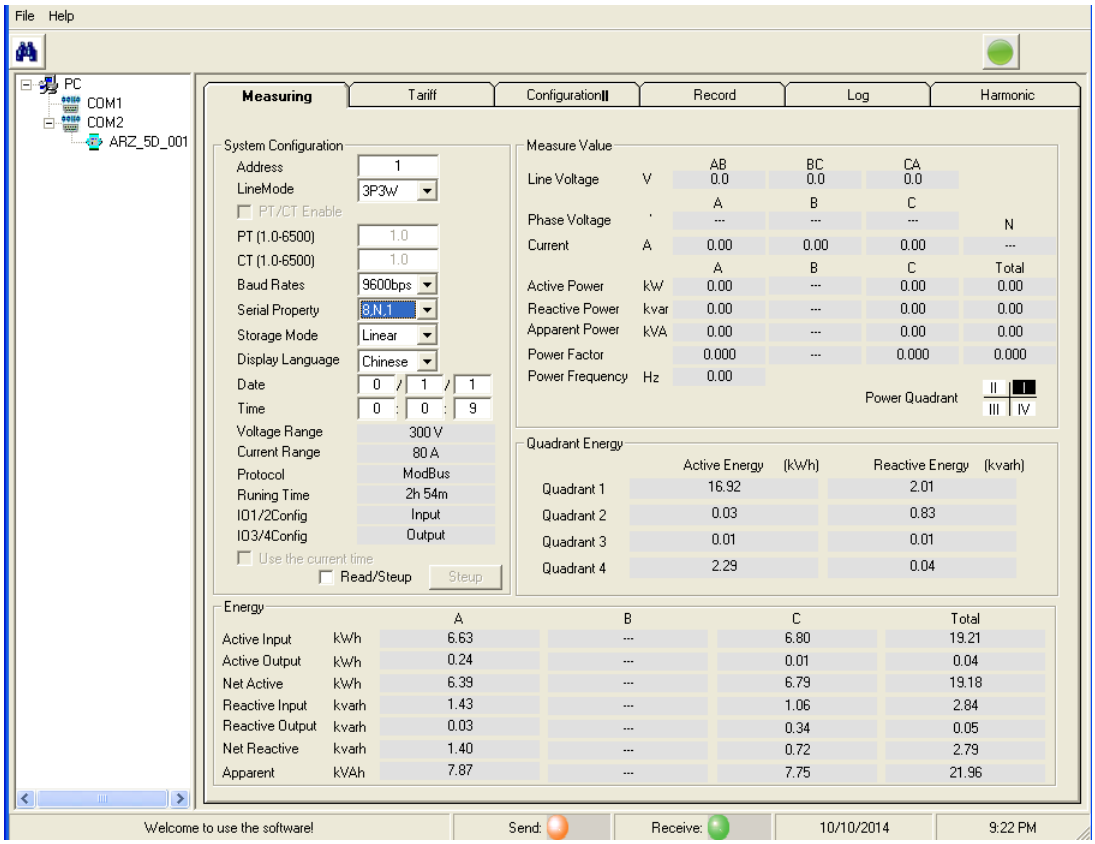


Fig. 140 3P3W display

Click “Read/Setup”, the user can modify address, wiring mode, PT/CT, baud rate, serial property, storage mode, , language, date, time and so on.

Tariff configuration and display interface (Fig. 141) mainly shows tariff configuration of meter and tariff energy. When enter user mode, the user can modify tariff enable, tariff source, current tariff, time zone number, the date in 12 time zones and the corresponded tome tables (Fig. 142 tariff configuration). The special day enable, date, and corresponded time table can be set (Fig. 143 special day configuration). Also the specific time and corresponded tariff of the 8 time tables can be set. (Fig143 tariff 8 time tables configuration).

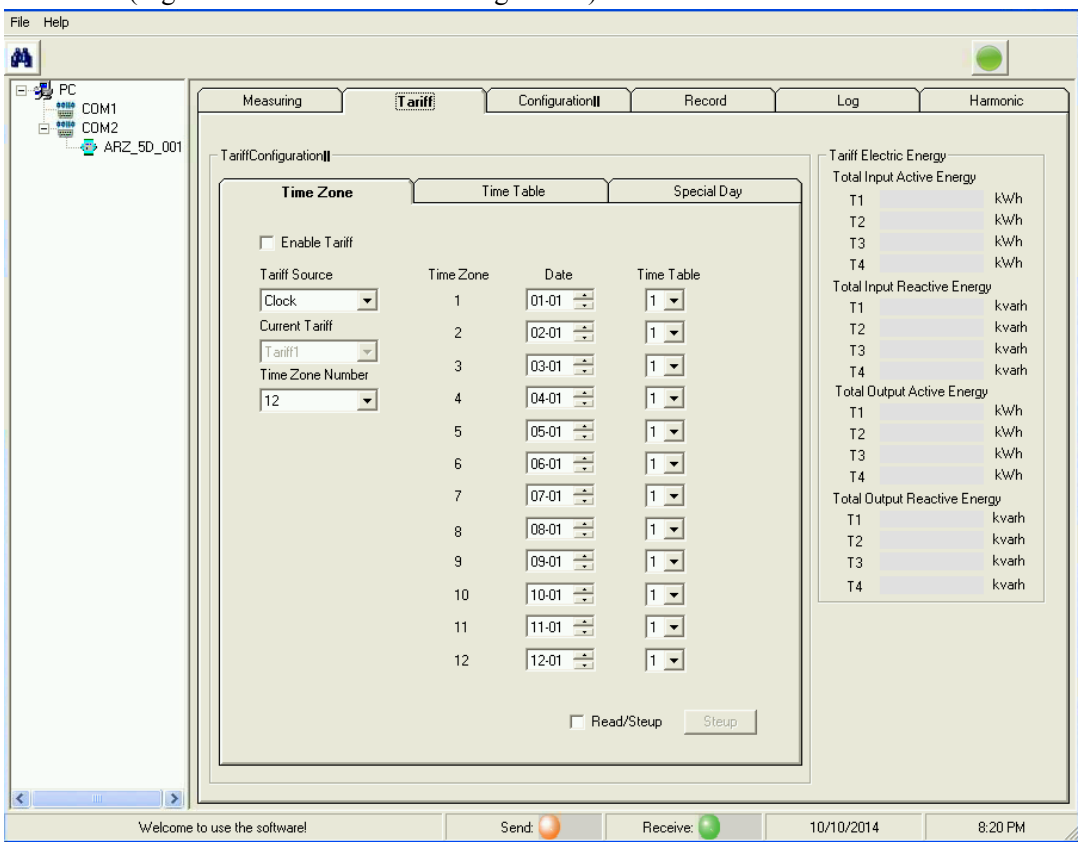


Fig.141 Tariff configuration and display

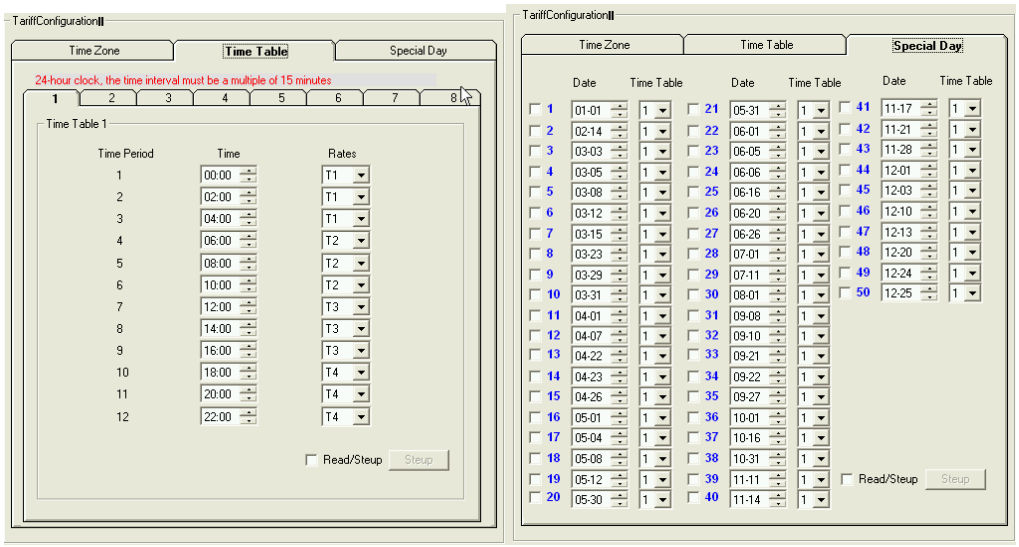


Fig. 142 Tariff configurationFig143 Tariff 8 time tables configuration

Enter the interface shown as fig. 144. It mainly displays IO setting which include 4 IO ports configuration: status display, Counting, pulse source, pulse constant, pulse width and state detection; Alarm setting; Demand record setting; Power freeze setting; and Load curve parameter setting.

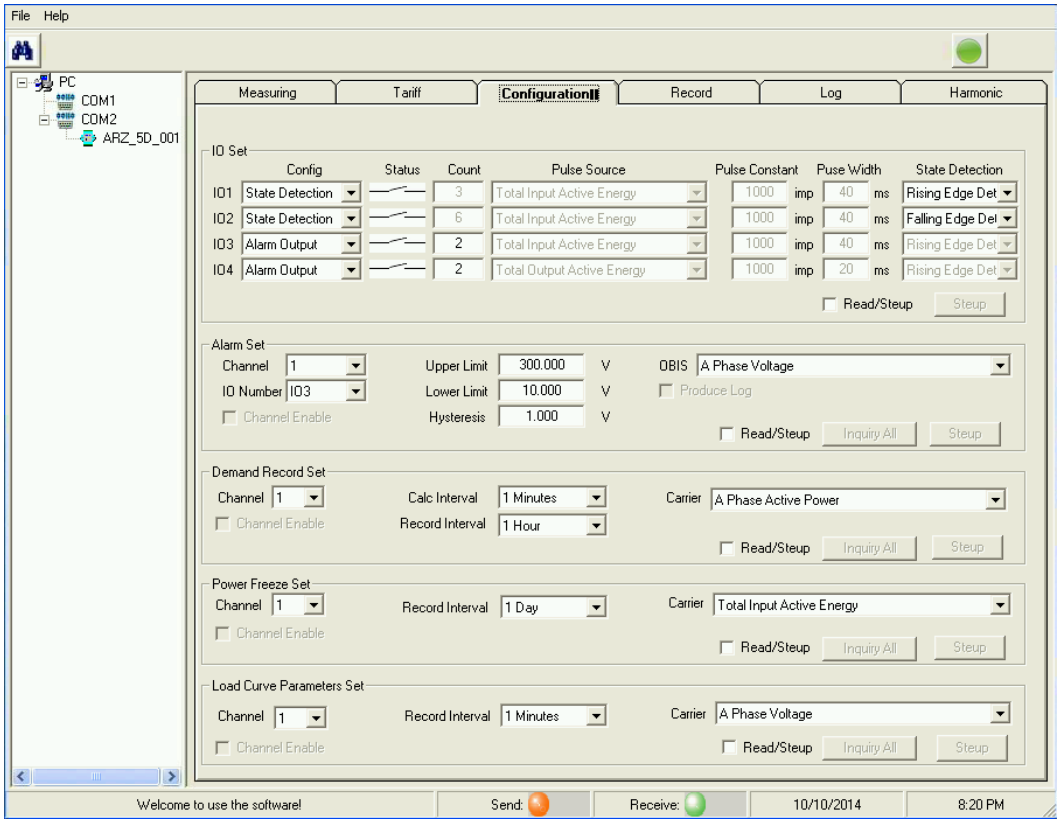


Fig. 144 Parameters configuration

IO setting: Select read/setup item, the user can set 4 IO ports configuration: status display, Counting, pulse source, pulse constant, pulse width and state detection (Fig.145 IO parameters configuration).

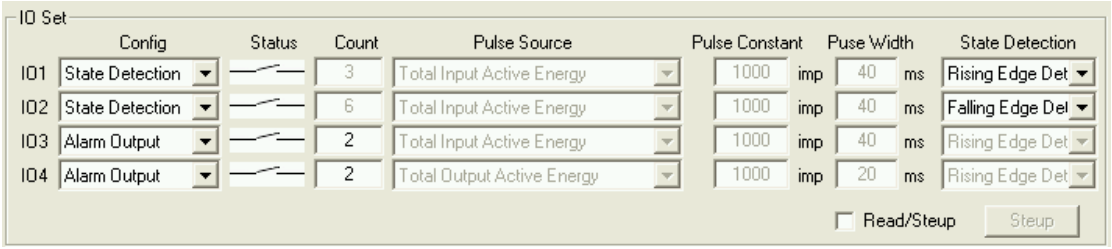


Fig.145 IO parameters configuration

Alarm setting: Select read/setup item, and click the channel item, then the PC will read the parameters of selected channel (Fig. 146 single alarm parameter query and setup). Click “Inquiry All”, the PC will read 25 channels and display all query interfaces and the interface can be set (Fig.147 Multi alarm parameter query and setup). Click “Setup” can set the current single channel (Fig. 146 single alarm parameter query and setup).

Fig. 146 Single alarm parameter query and setup

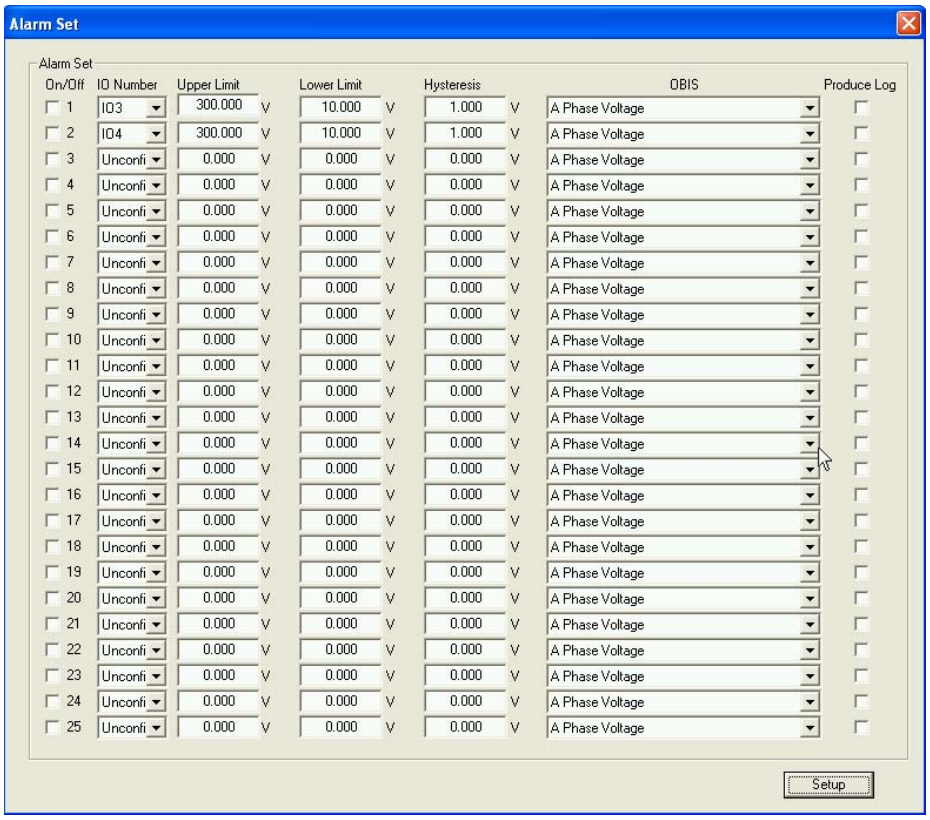


Fig.147 Multi alarm parameter query and setup

Demand record setting: Select “Read/Setup”, and click the channel item, then the PC will read the parameters of selected channel (Fig. 148 single demand record query and setup). Click “Inquiry All”, the PC will read 50 channels and display all query interfaces and the interface can be set (Fig.149 Multi demand record query and setup). Click “Setup” can set the current single channel (Fig. 148 single demand record query and setup).

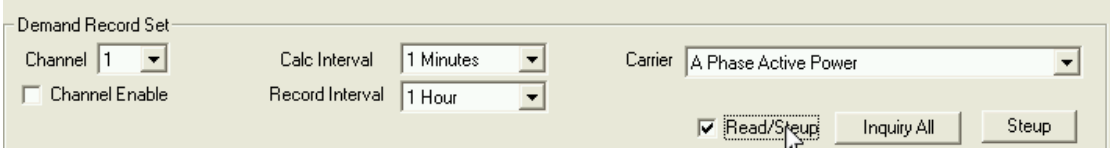


Fig.148 Single demand record query and setup

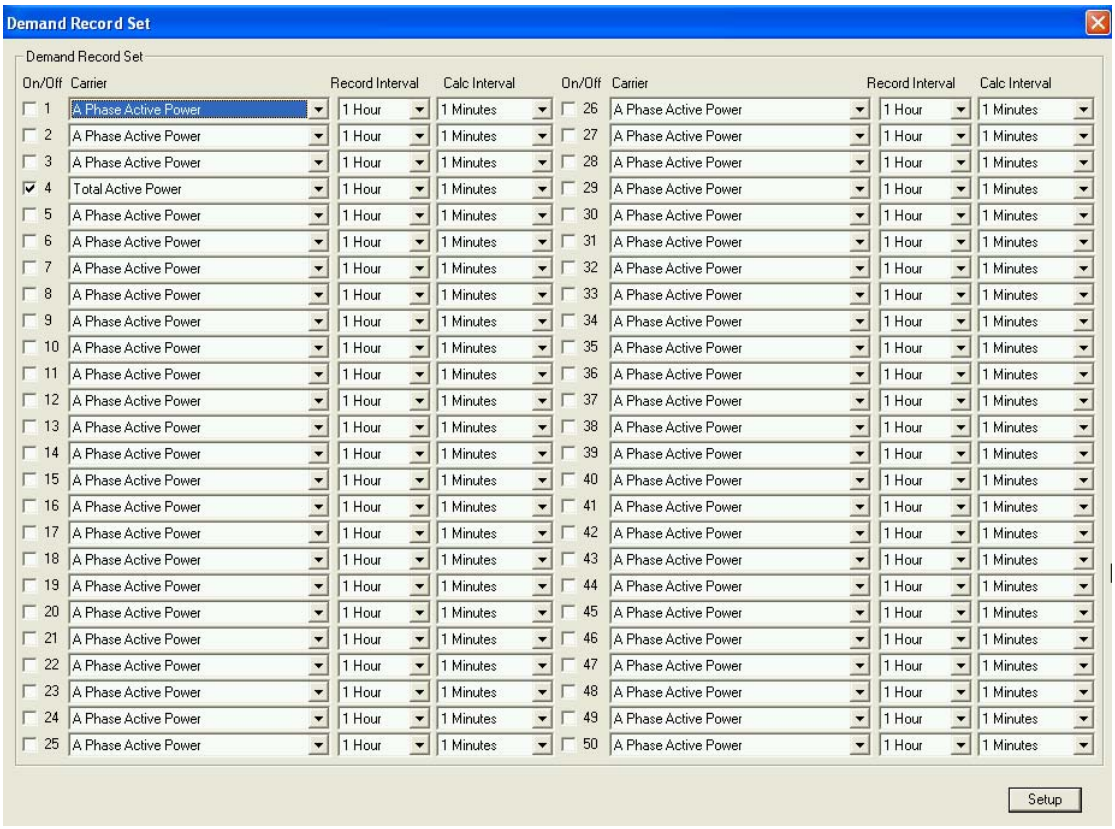


Fig.149 Multi demand record query and setup

Energy freeze setting: Select “Read/Setup”, and click the channel item, then the PC will read the parameters of selected channel (Fig. 150 Single power freeze parameter query and setup). Click “Inquiry All”, the PC will read 50 channels and display all query interfaces and the interface can be set (Fig.151 Multi power freeze parameter query and setup). Click “Setup” can set the current single channel (Fig. 150 Single power freeze parameter query and setup).

Fig. 150 Single power freeze parameter query and setup

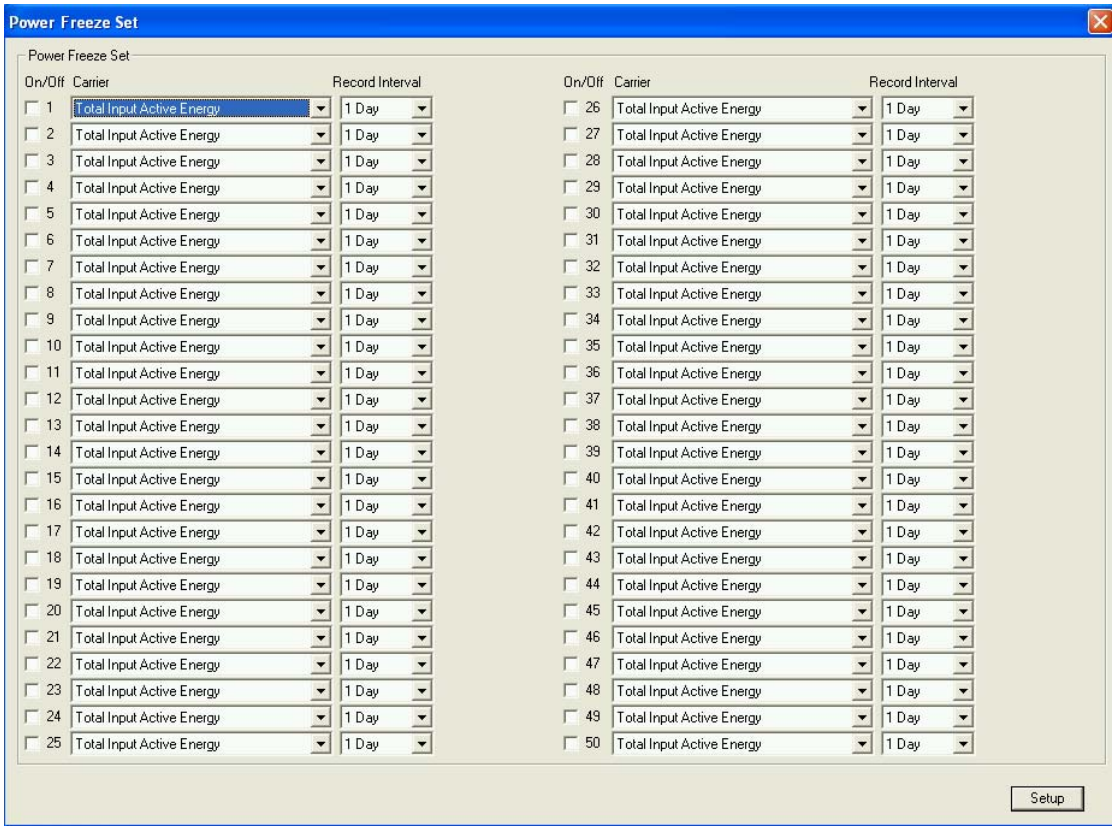
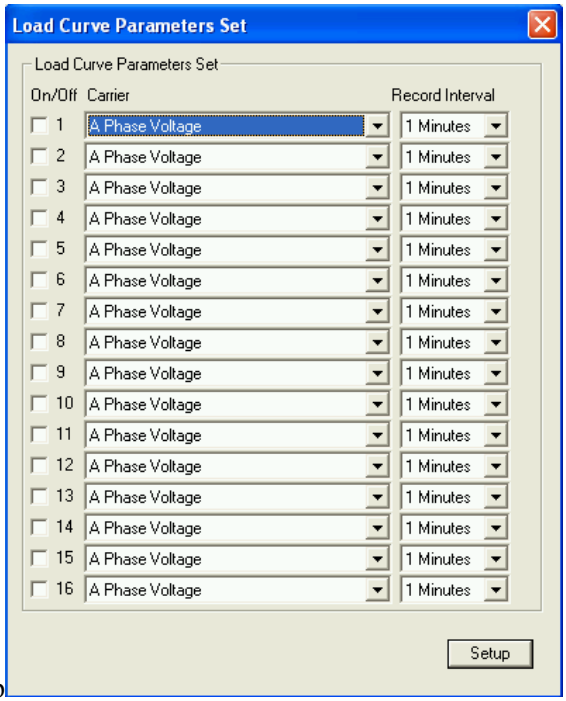


Fig.151 Multi power freeze parameter query and setup

Load Curve Parameters setting: Select “Read/Setup”, and click the channel item, then the PC will read the parameters of selected channel (Fig. 152 Single load curve parameter query and setup). Click “Inquiry All”, the PC will read 16 channels and display all query interfaces and the interface can be set (Fig.153 Multi load curve parameter query and setup). Click “Setup” can set the current single channel (Fig. 152 Single load curve parameter query and setup).

Fig. 152 Single load curve parameter query and



setup

Fig.151 Multi load curve parameter query and setup

Enter Record interface, click “Update record”, the PC will read total records of demand, power freeze, and load curve. Select different channel number, the corresponded total record could be checked. Click stop, the reading can be stopped. (Fig.154 Demand/power freeze/load curve record reading)

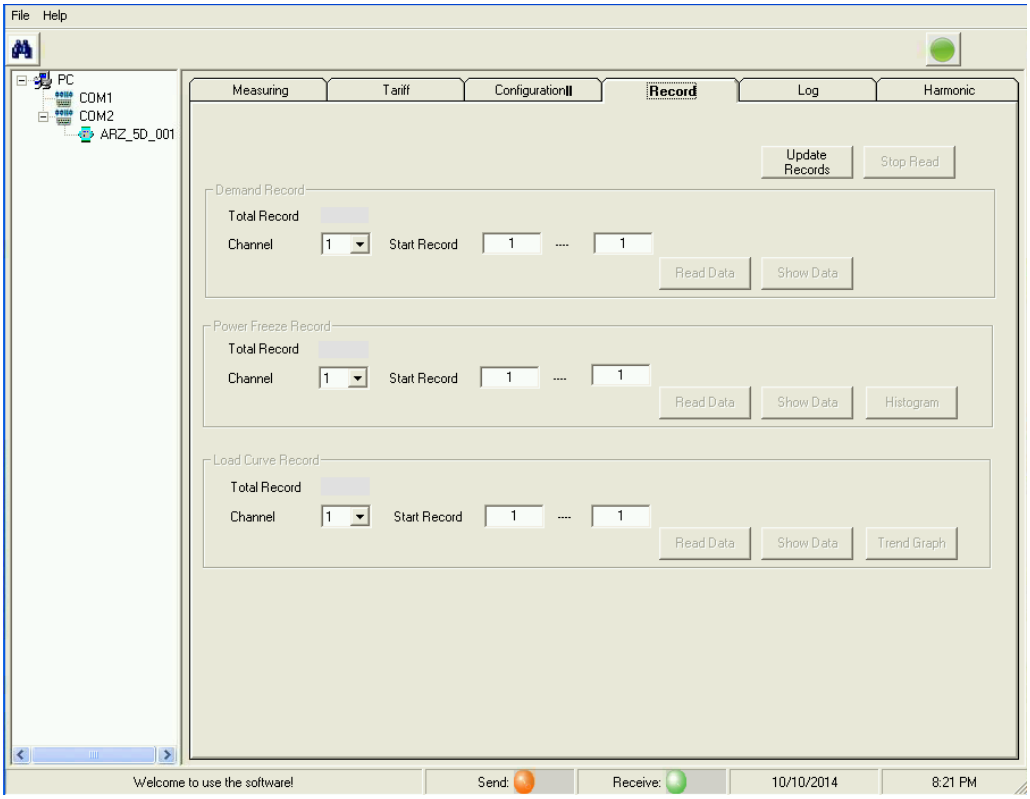


Fig.154 Demand/power freeze/load curve record reading

Click “Read data”, the user can read demand, power freeze and load curve record. Click “Show data”, the record will be popped up as in the following interface (Fig 155 Record display interface). Click “Print”button, then the interface can be printed.

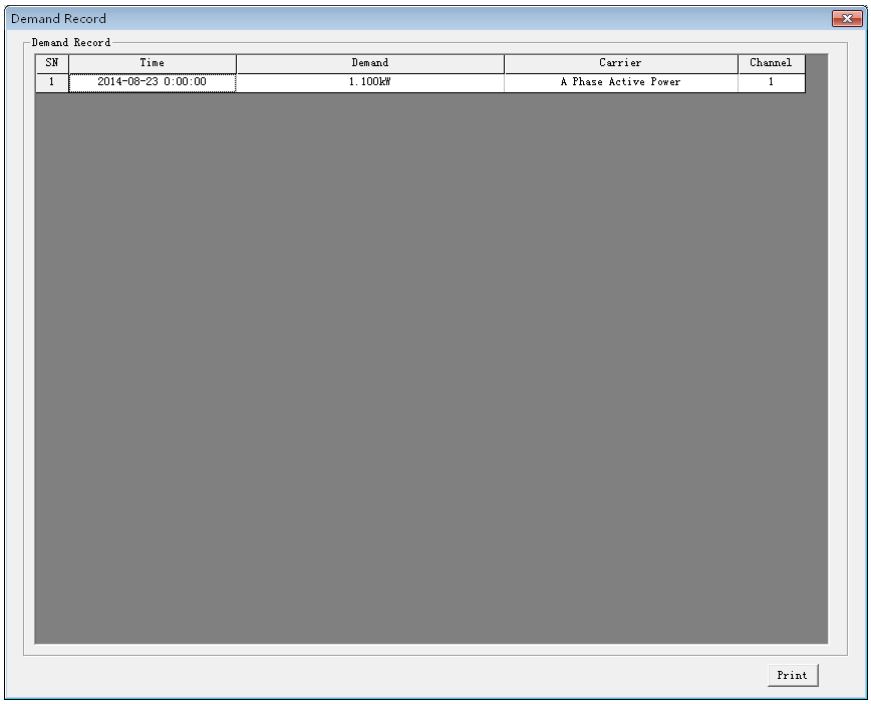


Fig 155 Record display interface

Click Histogram in power freeze record, the energy record diagram of recent single channel will be displayed (Fig. 156 Power freeze histogram). Click “Print” button, the histogram can be printed.

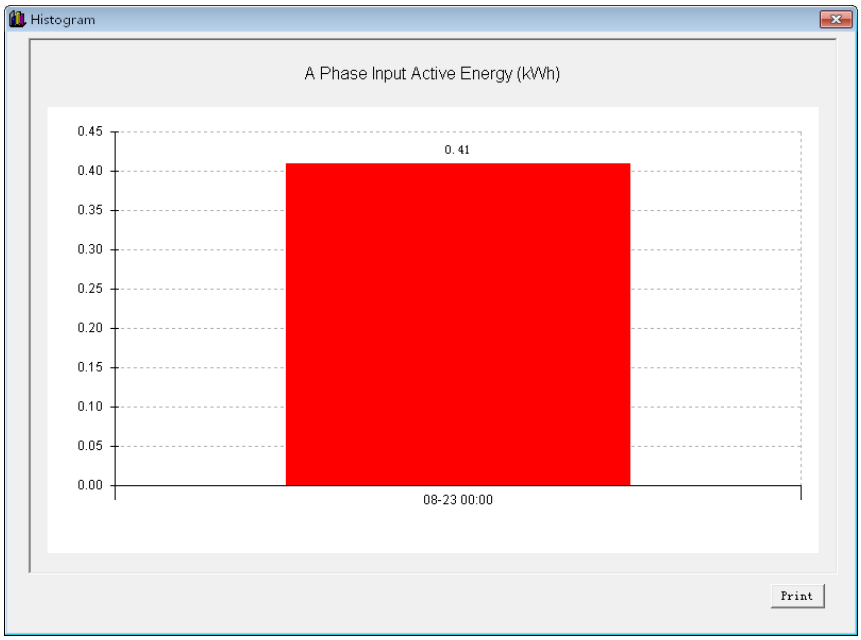


Fig. 156 Power freeze histogram

In load curve recording, click “trend graph” to display the trend graph of current channel (Fig. 157 Load curve trend graph). Click “Print” button to print the graph.

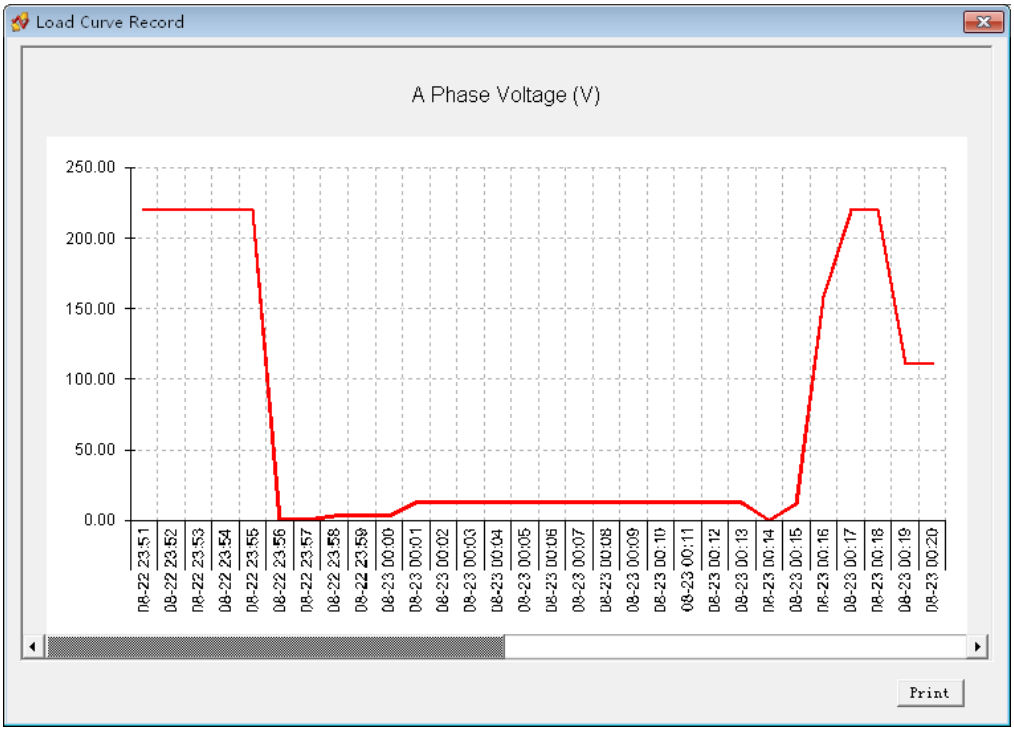


Fig. 157 Load curve trend graph

Log record interface: Click “Update record” and read the total numbers of system log, event log and power quality log (Fig 158 Log display). The user can select different log type to read. The reading can be stopped when clicking“stop read” button.

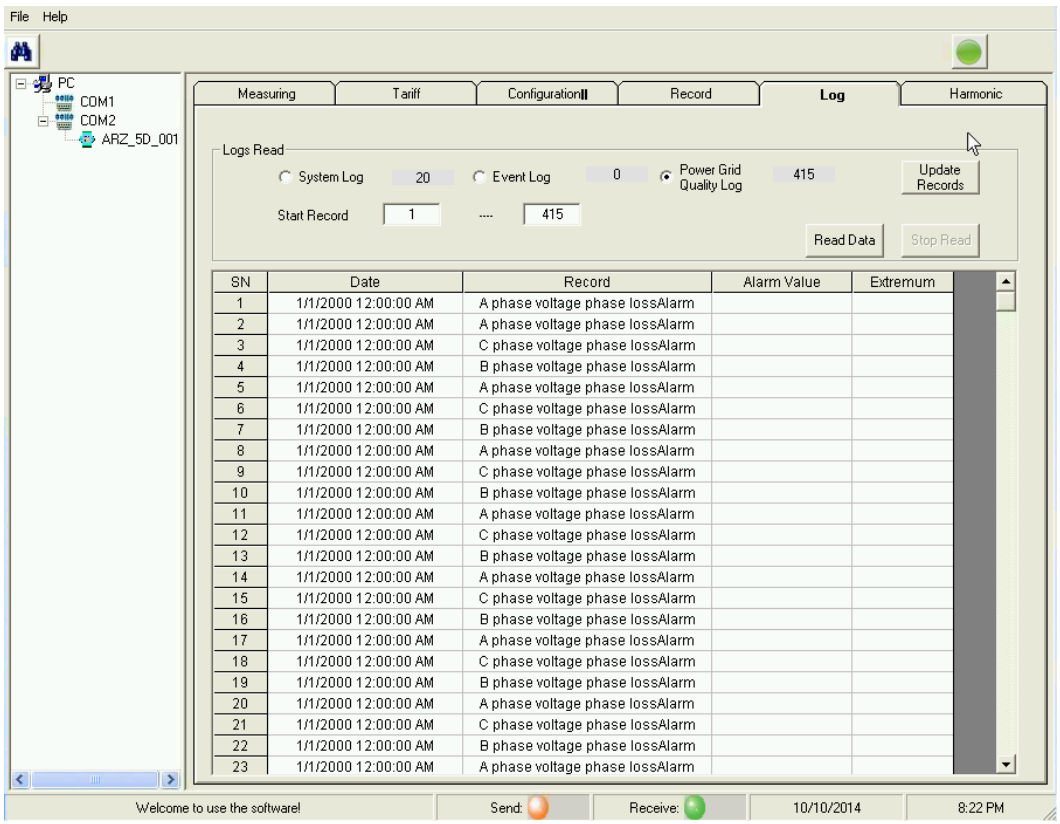


Fig 158 Log display

Harmonic display interface: This interface mainly display Voltage, Current phase angle,active power, reactive power, and apparent power of fundamental wave; Total harmonic content of Voltage and Current; 2nd -63rd harmonic content and phase angle. (Fig.159 Harmonic display)

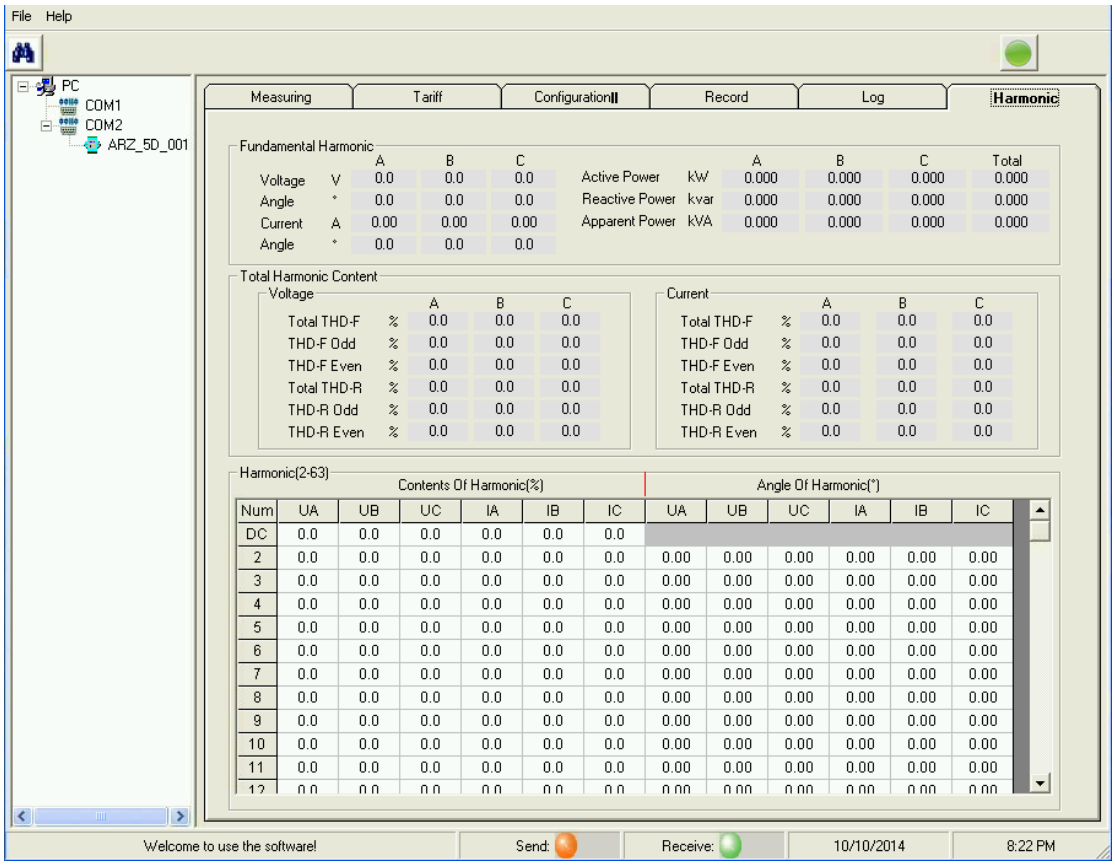


Fig.159 Harmonic display

Administration interface: Click Admin Login (Fig. 160), input the password (Fig. 161), press Confirm and then enter. The user can click setup/read to modify configuration and clear data of meter. Power off times, IO count, energy, record and log date can be cleared.

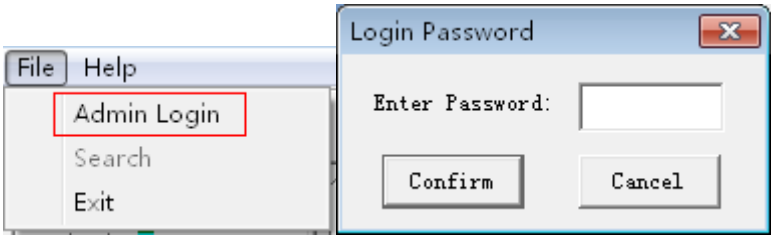


Fig. 160 Admin Login Fig. 161 Password input

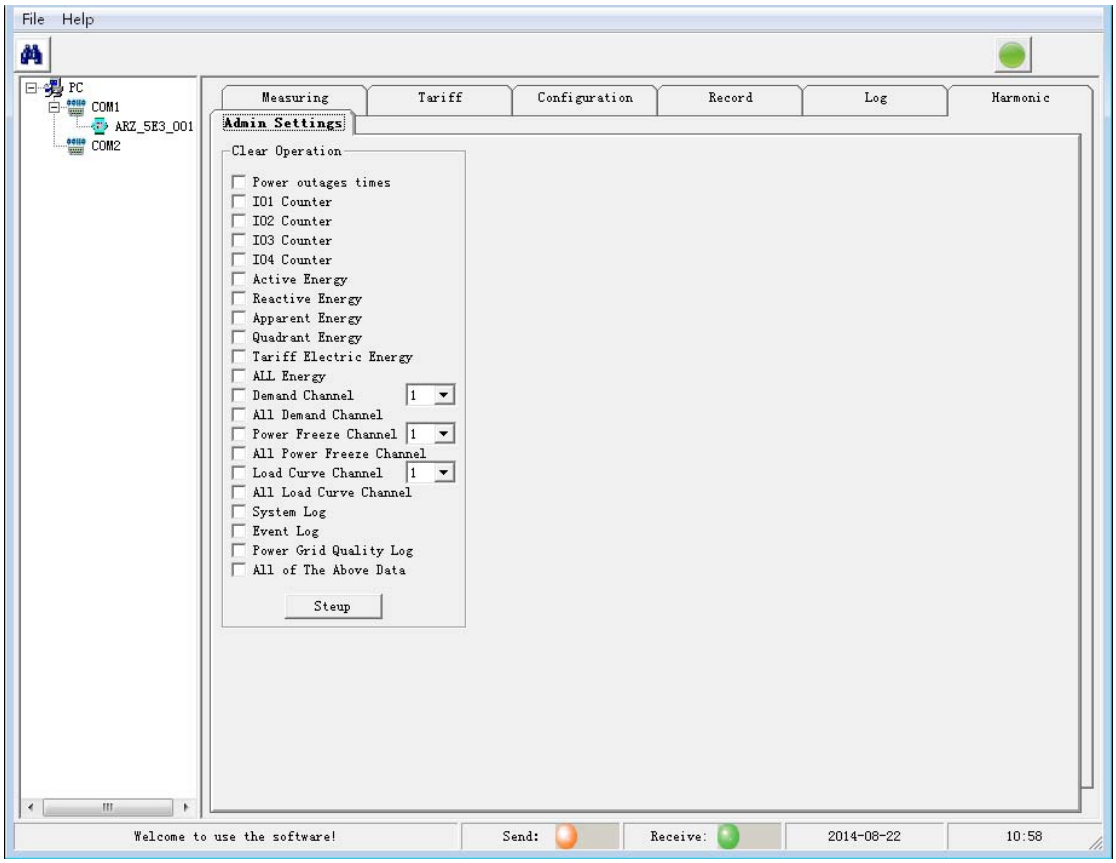


Fig. 162 Administrator interface

III. Communication

1. Communication Protocol

MODBUS RTU protocol, the data format as: **1 start bit ＋ 8 bit ＋ 1 stop bit**

2. RTU Command Format and Example

The communication adopts Modbus protocol code:
03H — read single and consecutive registers
06H — read single register
10H — read consecutive registers
RTU command format and example
03H — read single and consecutive registers (Max. 40 registers)
Send command:

NAME	BYTE	EXAMPLE
Meter address	1	01H
Function No.	2	03H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
No. of bytes (N) (High Byte)	5	00H
No. of bytes (N) (Low Byte)	6	02H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

Note: The meter with address 01H send 2 consecutive WORDS from the starting address 0102H.

Receive:

	BYTE	EXAMPLE
Meter address	1	01H
Function number	2	03H
No. of bytes (2N)	3	04H
Data1 (High)	4	00H
Data1 (Low)	5	01H
Data2 (High)	6	00H
Data2 (Low)	7	01H
CRC (High Byte)	8	CRC (H)
CRC (Low Byte)	9	CRC (L)

Note: The meter with address 01H receive 2 consecutive WORDS from the starting address 0102H.
06H ——Write single register

Send command:

	BYTE	EXAMPLE
Meter address	1	01H
Function No.	2	06H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
Data (High Byte)	5	00H
Data (Low Byte)	6	01H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

Note: Write 1 WORD data in the starting address 0102H register of the address 01H meter

Receive:

	BYTE	EXAMPLE
Meter address	1	01H
Function No.	2	06H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
Data (High Byte)	5	00H
Data (Low Byte)	6	01H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

Note: send and receive the same content.

10H ——Write consecutive registers.

Send command:

	BYTE	EXAMPLE
Meter address	1	01H
Function No.	2	10H
Address (High Byte)	3	01H
Address (Low Byte)	4	02H
Number of bytes (N) (High Byte)	5	00H
Number of bytes (N) (Low Byte)	6	02H
No. of byte (2N)	7	04H
Data 1 (High Byte)	8	00H
Data 1 (Low Byte)	9	01H
Data 2 (High Byte)	10	00H
Data 2 (Low Byte)	11	01H
CRC (High Byte)	12	CRC (H)
CRC (Low Byte)	13	CRC (L)

Note: Write 2 WORD data in 2 registers with starting address 0102H of the address 01H meter

Receive:

	BYTE	EXAMPLE
Meter address	1	01H
Function No.	2	10H

Address (High Byte)	3	01H
Address (Low Byte)	4	01H
Data (High Byte)	5	00H
Data (Low Byte)	6	02H
CRC (High Byte)	7	CRC (H)
CRC (Low Byte)	8	CRC (L)

3. Data Format

Primary energy uses four registers:

Real value = (integer part high byte *65536 + integer part low byte) ＋ (decimal part high byte *65536 + decimal part low byte) / 100000000

For example: Integer part high byte = 0000H = 0,

Integer part low byte = 0001H = 1,

Decimal part high byte = 0165H = 357,

Decimal part low byte = EC15H= 60437

After calculate, the real value= (0*65536 +1) ＋ (357*65536 + 60437) / 100000000

= 1.23456789MWh = 1234.56789kWh

Date is BCD code, the followings are the same.

Note: Energy calculation:(**[**register value**]** convert to decimal system) to the actual value, then calculate the energy using the above formula.

Energy data format

No.	**parameters**	**Data format (decimal system)**	**Direction**	**Unit**	**Description**
1	Voltage	999.9		V	＜1000V
2	Current	79.99		A	＜80A
3	Power factor	±1.000	directional		-1.000~1.000
4	Frequency	64.99		Hz	45.00~65.00
5	Active power	±999999	directional	MW	
6	Reactive power	±999999	directional	MVAr	
7	Apparent power	±999999		MVA	
10	Active energy	999999999	directional	MWh	
11	Reactive energy	999999999	directional	MVArh	
12	Phase angle	0.0°~359.9°	directional		
13	Current harmonic%	0~100%			
14	Voltage harmonic%	0~100%			

MODBUS command	**Functions**	**Description**
0x03	Read multiple registers	Read/write Max.40 registers.
0x10	Write multiple registers	
0x06	Write single register	

1. System parameter register

Register no. (HEX)	Read/ write	Type	Description	Remark
1000~1001	RO	unsigned	Software version	1000 register: Major version no. 1001 register: Minor version no.
1002~1003	RO	unsigned	Hardware version [1]	1002 register: Major version no. 1003 register: Minor version no.
1004~1005	RO	unsigned	Running time [1]	Unit: second
1006~1008			Remain	
1009	RO	unsigned	PT/CT enable[1]	0: not use PT/CT; 1: use
100A	RO	unsigned	Communication[1]	0: ModBus; 1: MBus
100B	RW	unsigned	Wiring mode [3]	0: 3P4W 1: 3P3W 2: 1P2W
100C~100D	RW	float	PT [3]	
100E~100F	RW	float	CT [3]	
1010	RW	unsigned	Voltage range[1]	
1011	RW	unsigned	Current range[1]	
1012	RW	unsigned	Language[3]	0: Chinese 1. English
1013	RW	unsigned	ModBus communication address[3]	1~247
1014	RW	unsigned	Baud rate[3]	Check table 1
1015	RW	unsigned	Transmission format[3]	Check table 2
1016	RW	unsigned	Storage mode[3]	0: Linear storage 1: Cycle storage
1017	RW	unsigned	IOdirection selection[1]	4 IO ports input output direction selection: IO 1/2 in a group, IO3/4 in a group, 2 IO ports in each group has the same direction, High byte controls IO 3/4, low byte controls IO 1/2. In each byte, 0 means configuring the 2 IO ports as output; 1 means input; 2 means without this function.
1018~101A	RW	BCD	present time[3]	BCD code, pls check table 3.
101B	WO	unsigned	Administrator password[2]	
101C	WO	unsigned	User password [2]	

1. This info can be written in factory mode, not available for the uses.

2. Write the correct old password to enter administrator/user mode, and then do the special write operation in the corresponding mode; the administrator super password is: 0726 (the same with other products)
3. The data can be modified after entering user mode, administrator mode or factory mode.

Table 1 Baud rate correspondence table

Data	Corresponded baud rate (bps)
1	2400
2	4800
3	9600
4	19200
5	38400

Table 2 Transmission corresponded table

Data	Trans. format	Description
0	8N1	1start bit, 8 data bits, 0 parity bit, 1 stop bit
1	8N2	1start bit, 8 data bits, 0 parity bit, 2 stop bits
2	8E1	1start bit, 8 data bits, 1 even parity bit, 1 stop bit
3	8O1	1start bit, 8 data bits, 0 odd parity bit, 1 stop bit

Table 3 Time format

0	1	2	3	4	5
year	month	day	hour	minute	second

0 byte is the first receive byte

2. Instantaneous electric measurement register

Primary register:

Register (HEX)	**Read/ write**	**Type**	**Description**		**Remark**
2000~2001	RO	float	L1-N	Phase voltage	Unit: V
2002~2003	RO	float	L2-N		
2004~2005	RO	float	L3-N		
2006~2007	RO	float	L1—L2	Line voltage	
2008~2009	RO	float	L1—L3		
200A~200B	RO	float	L3—L2		
200C~200D	RO	float	L1	Current	Unit: A
200E~200F	RO	float	L2		
2010~2011	RO	float	L3		
2012~2013	RO	float	N		
2014~2015	RO	float	L1	Active power	Unit: w
2016~2017	RO	float	L2		
2018~2019	RO	float	L3		

201A~201B	RO	float	Total		
201C~201D	RO	float	L1	Reactive power	Unit: var
201E~201F	RO	float	L2		
2020~2021	RO	float	L3		
2022~2023	RO	float	Total		
2024~2025	RO	float	L1	Apparent power	Unit: VA
2026~2027	RO	float	L2		
2028~2029	RO	float	L3		
202A~202B	RO	float	Total		
202C~202D	RO	float	L1	Power factor	
202E~202F	RO	float	L2		
2030~2031	RO	float	L3		
2032~2033	RO	float	Total		
2034~2035	RO	float	Frequency		Unit: Hz
2036	RO	unsigned	Power quadrant		0~3:1-4 quadrant

Secondary register

Register (HEX)	**Read/ write**	**Type**	**Description**		**Remark**
2100~2101	RO	float	L1-N	Phase voltage	Unit: V
2102~2103	RO	float	L2-N		
2104~2105	RO	float	L3-N		
2106~2107	RO	float	L1—L2	Line voltage	
2108~2109	RO	float	L1—L3		
210A~210B	RO	float	L3—L2		
210C~210D	RO	float	L1	Current	Unit: A
210E~210F	RO	float	L2		
2110~2111	RO	float	L3		
2112~2113	RO	float	N		
2114~2115	RO	float	L1	Active power	Unit: w
2116~2117	RO	float	L2		
2118~2119	RO	float	L3		
211A~211B	RO	float	Total		
211C~211D	RO	float	L1	Reactive power	Unit: var
211E~211F	RO	float	L2		
2120~2121	RO	float	L3		
2122~2123	RO	float	Total		
2124~2125	RO	float	L1	Apparent power	Unit: VA
2126~2127	RO	float	L2		
2128~2129	RO	float	L3		
212A~212B	RO	float	Total		

3. Harmonic register

Register (HEX)	Read/ write	Type	Description		Remark
3000~3001	RO	float	L1 amplitude	Voltage fundamental	
3002~3003	RO	Float	L1 phase angle		
3004~3005	RO	float	L2 amplitude		
3006~3007	RO	Float	L2 phase angle		
3008~3009	RO	float	L3amplitude		
300A~300B	RO	Float	L3phase angle		
300C~300D	RO	float	L1 amplitude	Current fundamental	
300E~300F	RO	Float	L1 phase angle		
3010~3011	RO	float	L2 amplitude		
3012~3013	RO	Float	L2 phase angle		
3014~3015	RO	float	L3 amplitude		
3015~3017	RO	Float	L3 phase angle		
3018~3019	RO	float	L1	Fundamental active power	Unit: w
301A~301B	RO	float	L2		
301C~301D	RO	float	L3		
301E~301F	RO	float	Total		
3020~3021	RO	float	L1	Fundamental reactive power	Unit: var
3022~3023	RO	float	L2		
3024~3025	RO	float	L3		
3026~3027	RO	float	Total		
3028~3029	RO	float	L1	Fundamental apparent power	Unit: VA
302A~302B	RO	float	L2		
302C~302D	RO	float	L3		
302E~302F	RO	float	Total		
3030	RO	unsigned	L1	Voltage harmonic total content -F	Content resolution: 0.001
3031	RO	unsigned	L2		
3032	RO	unsigned	L3		
3033	RO	unsigned	L1	Voltage odd harmonic total content -F	
3034	RO	unsigned	L2		
3035	RO	unsigned	L3		
3036	RO	unsigned	L1	Voltage even harmonic total content -F	
3037	RO	unsigned	L2		
3038	RO	unsigned	L3		
3039	RO	unsigned	L1	Voltage harmonic total content -R	
303A	RO	unsigned	L2		
303B	RO	unsigned	L3		
303C	RO	unsigned	L1	Voltage odd harmonic total content -R	
303D	RO	unsigned	L2		
303E	RO	unsigned	L3		
303F	RO	unsigned	L1	Voltage even	

Register (HEX)	Read/ write	Type	Description		Remark
3040	RO	unsigned	L2	harmonic total content -R	
3041	RO	unsigned	L3		
3042	RO	unsigned	L1	Current harmonic total content -F	
3043	RO	unsigned	L2		
3044	RO	unsigned	L3		
3045	RO	unsigned	L1	Current odd harmonic total content -F	
3046	RO	unsigned	L2		
3047	RO	unsigned	L3		
3048	RO	unsigned	L1	Current even harmonic total content -F	
3049	RO	unsigned	L2		
304A	RO	unsigned	L3		
304B	RO	unsigned	L1	Current harmonic total content -R	
304C	RO	unsigned	L2		
304D	RO	unsigned	L3		
304E	RO	unsigned	L1	Current odd harmonic total content -R	
304F	RO	unsigned	L2		
3050	RO	unsigned	L3		
3051	RO	unsigned	L1	Current even harmonic total content -R	
3052	RO	unsigned	L2		
3053	RO	unsigned	L3		
3054	RO	unsigned	DC amplitude content	Every harmonic of Voltage L1	Content resolution: 0.001 Phase angle resolution: 0.01degree
3055	RO	unsigned	remain		
3056	RO	unsigned	2nd harmonic content		
3057	RO	unsigned	2nd harmonic phase angle		
30D0	RO	unsigned	63rd harmonic content		
30D1	RO	unsigned	63rdharmonic phase angle		
30D2~314F	RO	unsigned	Same format as above	Voltage L2 harmonic	
3150~31CD	RO	unsigned	Format ibid	Voltage L3 harmonic	
31CE~324B	RO	unsigned	Format ibid	Current L1harmonic	
324C~32C9	RO	unsigned	Format ibid	Current L2 harmonic	
32CA~3347	RO	unsigned	Format ibid	Current L3 harmonic	

4. Energy register

Register (HEX)	Read/ write	Type	Description		Remark
4000~4003	RO	unsigned	L1	Active input energy	Unit: 0.001kWh
4004~4007	RO	unsigned	L2		
4008~400B	RO	unsigned	L3		
400C~400F	RO	unsigned	Total		
4010~4013	RO	unsigned	L1	Active output energy	
4014~4017	RO	unsigned	L2		
4018~401B	RO	unsigned	L3		
401C~401F	RO	unsigned	Total		
4020~4023	RO	signed	L1	Net active energy	
4024~4027	RO	signed	L2		
4028~402B	RO	signed	L3		
402C~402F	RO	signed	Total		
4030~4033	RO	unsigned	L1	Reactive input energy	Unit: 0.001Kvarh
4034~4037	RO	unsigned	L2		
4038~403B	RO	unsigned	L3		
403C~403F	RO	unsigned	Total		
4040~4043	RO	unsigned	L1	Reactive output energy	
4044~4047	RO	unsigned	L2		
4048~404B	RO	unsigned	L3		
404C~404F	RO	unsigned	Total		
4050~4053	RO	signed	L1	Net reactive energy	
4054~4057	RO	signed	L2		
4058~405B	RO	signed	L3		
405C~405F	RO	signed	Total		
4060~4063	RO	unsigned	L1	Apparent energy	Unit: 0.001kVAh
4064~4067	RO	unsigned	L2		
4068~406B	RO	unsigned	L3		
406C~406F	RO	unsigned	Total		

5.Multi tariff setting register

Register (HEX)	Read/ write	Type	Description	Remark
5000	RW	unsigned	Tariff ON/OFF	0: Tariff OFF 1: Tariff ON
5001	RW	unsigned	Tariff source	0: Clock (calendar) 1: communication2: IO1/2input* 3: IO3/4 input*
5002	RW	unsigned	Present tariff	0 ~ 3：Tariff1—4 Only valid when tariff source set to “communication”
5003	RW	unsigned	Time zone numbers	1 ~ 12

Register (HEX)	Read/ write	Type	Description	Remark
5004	RW	BCD	Time zone 1	Time zone table (BCD code) 0101 ~ 1231(Jan. 1st ~ Dec. 31st) The day before start time zone can be the end date of last time zone.
5005	RW	BCD	Time zone 2	
5006	RW	BCD	Time zone 3	
5007	RW	BCD	Time zone 4	
5008	RW	BCD	Time zone 5	
5009	RW	BCD	Time zone 6	
500A	RW	BCD	Time zone 7	
500B	RW	BCD	Time zone 8	
500C	RW	BCD	Time zone 9	
500D	RW	BCD	Time zone 10	
500E	RW	BCD	Time zone 11	
500F	RW	BCD	Time zone 12	
5010	RW	unsigned	Time zone 1 time table	0 ~ 7: time table 1 ~ time table 8
5011	RW	unsigned	Time zone 2 time table	
5012	RW	unsigned	Time zone 3 time table	
5013	RW	unsigned	Time zone 4 time table	
5014	RW	unsigned	Time zone 5 time table	
5015	RW	unsigned	Time zone 6 time table	
5016	RW	unsigned	Time zone 7 time table	
5017	RW	unsigned	Time zone 8 time table	
5018	RW	unsigned	Time zone 9 time table	
5019	RW	unsigned	Time zone 10 time table	
501A	RW	unsigned	Time zone 11 time table	
501B	RW	unsigned	Time zone 12 time table	
501C	RW	BCD	Time interval1	Time table 1 (BCD code) 0000 ~ 2359 (0 : 0 ~ 23 : 59)
501D	RW	BCD	Time interval 2	
501E	RW	BCD	Time interval 3	
501F	RW	BCD	Time interval 4	
5020	RW	BCD	Time interval 5	
5021	RW	BCD	Time interval 6	
5022	RW	BCD	Time interval 7	
5023	RW	BCD	Time interval 8	
5024	RW	BCD	Time interval 9	
5025	RW	BCD	Time interval 10	
5026	RW	BCD	Time interval 11	
5027	RW	BCD	Time interval 12	
5028~5033	RW		Time table 2	As same as table1
5034~503F	RW		Time table 3	As same as table 1
5040~504B	RW		Time table 4	As same as table 1
504C~5057	RW		Time table 5	As same as table 1
5058~5063	RW		Time table 6	As same as table 1

Register (HEX)	Read/ write	Type	Description	Remark
5064~506F	RW		Time table 7	As same as table 1
5070~507B	RW		Time table 8	As same as table 1
507C	RW	unsigned	Time interval 1tariff	Time table1 tariff 0：T1 1：T2 2：T3 3：T4
507D	RW	unsigned	Time interval 2 tariff	
507E	RW	unsigned	Time interval 3 tariff	
507F	RW	unsigned	Time interval 4 tariff	
5080	RW	unsigned	Time interval 5 tariff	
5081	RW	unsigned	Time interval 6 tariff	
5082	RW	unsigned	Time interval7 tariff	
5083	RW	unsigned	Time interval 8 tariff	
5084	RW	unsigned	Time interval 9 tariff	
5085	RW	unsigned	Time interval 10 tariff	
5086	RW	unsigned	Time interval 11 tariff	
5087	RW	unsigned	Time interval 12 tariff	
5088~5093	RW	unsigned	Time table 2 tariff	As same as time table 1 tariff
5094~509F	RW	unsigned	Time table 3 tariff	As same as time table 1 tariff
50A0~50AB	RW	unsigned	Time table 4 tariff	As same as time table 1 tariff
50AC~50B7	RW	unsigned	Time table 5 tariff	As same as time table 1 tariff
50B8~50C3	RW	unsigned	Time table 6 tariff	As same as time table 1 tariff
50C4~50CF	RW	unsigned	Time table 7 tariff	As same as time table 1 tariff
50D0~50DB	RW	unsigned	Time table 8 tariff	As same as time table 1 tariff
50DC	RW	BCD	Special day1	0101 ~ 1231(BCD code)
50DD	RW	unsigned	Special day 1time table	MSB: 0: OFF; 1: ON LSB: 0 ~ 7, time table 1 ~ time table 8
…	RW			
513E	RW	BCD	Special day 50	0101 ~ 1231（BCD code）
513F	RW	unsigned	Special day 50 time table	MSB: 0: OFF; 1: ON LSB: 0 ~ 7, time table 1 ~ time table 8

Note: Register in this group only can write when enter user mode, administrator mode or factory mode.

* Before setting IO port as tariff source, pls make sure the corresponded IO port is at “not configured” or “tariff source” state. If the corresponded IO port is “not configured”, when setting IO port as tariff source, the 2 corresponded ports function (6000~6001 or 6002~6003) will write as “tariff source input”.

6. Tariff energy register

Register (HEX)	Read/write	Type	Description		Remark
5300~5303	RO	unsigned	T1	Total input active energy	Unit: 0.001kWh
5304~5307	RO	unsigned	T2		
5308~530B	RO	unsigned	T3		
530C~530F	RO	unsigned	T4		
5310~5313	RO	unsigned	T1	Total output active energy	
5314~5317	RO	unsigned	T2		
5318~531B	RO	unsigned	T3		
531C~531F	RO	unsigned	T4		
5320~5323	RO	unsigned	T1	Total input reactive energy	Unit: 0.001Kvarh
5324~5327	RO	unsigned	T2		
5328~532B	RO	unsigned	T3		
532C~532F	RO	unsigned	T4		
5330~5333	RO	unsigned	T1	Total output reactive energy	
5334~5337	RO	unsigned	T2		
5338~533B	RO	unsigned	T3		
533C~533F	RO	unsigned	T4		

7. Quadrant energy register

Register (HEX)	Read/ write	Type	Description	Remark
5400~5403	RO	signed	Quadrant 1 reactive energy	Unit: 0.001Kvarh
5404~5407	RO	signed	Quadrant 2 reactive energy	
5408~540B	RO	signed	Quadrant 3 reactive energy	
540C~540F	RO	signed	Quadrant 4 reactive energy	
5410~5413	RO	signed	Quadrant 1 active energy	
5414~5417	RO	signed	Quadrant 2 active energy	
5418~541B	RO	signed	Quadrant 3 active energy	
541C~541F	RO	signed	Quadrant 4 active energy	

8. IO parameters register

Register (HEX)	Read/ write	Type	Description	Remark	
6000	RW	unsigned	IO1function	0: not configure IO port function 1~4:1: pulse output; 2: Alarm output 3: tariff source input 4: state action input	
6001	RW	unsigned	IO2function		
6002	RW	unsigned	IO3 function		
6003	RW	unsigned	IO4 function		
6004	RO	unsigned	IO1 state	0: disconnect; 1: close	
6005	RO	unsigned	IO2 state		
6006	RO	unsigned	IO3 state		
6007	RO	unsigned	IO4 state		
6008	RW	unsigned	IO1 count	Alarm output/ state action input count; It will clear when IO function changed.	
6009	RW	unsigned	IO2 count		
600A	RW	unsigned	IO3 count		
600B	RW	unsigned	IO4 count		
600C	RW	unsigned	IO1pulse source	0~3, check table 4	Only valid when setting pulse output.
600D	RW	unsigned	IO1 pulse constant	1~9999imp	
600E	RW	unsigned	IO1 pulse width	10~990ms	
600F	RW	unsigned	IO1state action	0: inspect rising edge 1: inspect falling edge Only valid when state actioninput.	
6010	RW	unsigned	IO2 pulse source	0~3, check table 4	Only valid when IO setting is pulse output.
6011	RW	unsigned	IO2pulse constant	1~9999imp	
6012	RW	unsigned	IO2 pulse width	10~990ms	
6013	RW	unsigned	IO2stateinspection	0: inspect rising edge 1: inspect falling edge Only valid when state actioninput.	
6014	RW	unsigned	IO3 pulse source	0~3, check table 4	I Only valid when IO setting is pulse output.
6015	RW	unsigned	IO3 pulse constant	1~9999imp	
6016	RW	unsigned	IO3 pulse width	10~990ms	
6017	RW	unsigned	IO3 state action	0: inspect rising edge 1: inspect falling edge Only valid when state action input.	
6018	RW	unsigned	IO4 pulse source	0~3, check table 4	Only valid when IO setting is pulse output.
6019	RW	unsigned	IO4 pulse constant	1~9999imp	
601A	RW	unsigned	IO4 pulse width	10~990ms	
601B	RW	unsigned	IO4 state action	0: inspect rising edge 1: inspect falling edge Only valid when state action input.	

Note: Register in this group only can write when enter user mode, administrator mode or factory mode.

Table 4: when IO setting is pulse output, the corresponded pulse sources are as follows:

Data	Content
0	Input active total energy
1	Output active total energy
2	Input reactive total energy
3	Output reactive total energy

Table 5: when IO setting is tariff source, the corresponded tariffs are as follows:

IO3	IO4	Tariff
0	0	T1
0	1	T2
1	0	T3
1	1	T4

9. Alarm parameter register

Register (HEX)	**Read/ write**	**Type**	**Description**	**Remark**
7000	RW	unsigned	To be operated channel no.	1~25
7001	RW	unsigned	Channel enable switch	0: close channel; 1: start channel
7002	RW	unsigned	OBIS	Check meter 6
7003	RW	unsigned	Corresponded IO port	0: not configure 1~4: IO1~IO4
7004	RW	unsigned	Whether generate log	0: close log; 1: generate log
7005 ~7006	RW	float	Upper limit	For voltage type alarm, unit is V 对 For current type alarm, unit is A For active power type, unit is W For reactive power type, unit isvar For apparent power type, unit isVA
7007 ~7008	RW	float	Lower limit (only valid when OBIS set to Voltage)	
7009 ~700A	RW	float	Return difference	

Note: 7001~700Acan write when enter user mode, administrator mode or factory mode.

Meter 6: Alarm channel option OBIS

No.	**OBIS**	**No.**	**OBIS**	**No.**	**OBIS**
0	Phase A voltage	14	Total reactive power	28	Phase C voltage total harmonic distortion
1	Phase B voltage	15	Phase A reactive power		
2	Phase C voltage	16	Phase B reactive power		
3	Phase AB voltage	17	Phase C reactive power		
4	Phase BC voltage	18	Total apparent power		
5	Phase AC voltage	19	Phase A apparent power		
6	Phase A current	20	Phase B apparent power		
7	Phase B current	21	Phase C apparent power		
8	Phase C current	22	Total power factor		
9	Neutral current	23	Phase A power factor		
10	Total active power	24	Phase B power factor		
11	Phase A active power	25	Phase C power factor		
12	Phase B active power	26	Phase A voltage total harmonic distortion		
13	Phase C active power	27	Phase B voltage total harmonic distortion		

No.	OBIS	1P2W	3P3W	3P4W
0	Phase A voltage	✔		✔
1	Phase B voltage			✔
2	Phase C voltage			✔
3	Phase AB voltage		✔	✔
4	Phase BC voltage		✔	✔
5	Phase AC voltage		✔	✔
6	Phase A current	✔	✔	✔
7	Phase B current		✔	✔
8	Phase C current		✔	✔
9	Neutral current			✔
10	Total active power		✔	✔
11	Phase A active power	✔	✔	✔
12	Phase B active power			✔

13	Phase C active power		✔	✔
14	Total reactive power		✔	✔
15	Phase A reactive power	✔	✔	✔
16	Phase B reactive power			✔
17	Phase C reactive power		✔	✔
18	Total apparent power		✔	✔
19	Phase A apparent power	✔	✔	✔
20	Phase B apparent power			✔
21	Phase C apparent power		✔	✔
22	Total power factor		✔	✔
23	Phase A power factor	✔	✔	✔
24	Phase B power factor			✔
25	Phase C power factor		✔	✔
26	PhaseA voltage total harmonic distortion	✔	✔	✔
27	Phase B voltage total harmonic distortion		✔	✔
28	Phase C voltage total harmonic distortion		✔	✔

10. Demand setup and record register

Register (HEX)	Read/ write	Type	Description	Remark
8000	RW	unsigned	To be operated channel no.	1~50
8001	RW	unsigned	Channel enable switch	0: close the channel 1: start the channel
8002	RW	unsigned	Carrier	Check table 7
8003	RW	unsigned	Calculating interval	Check table 8
8004	RW	unsigned	Record interval	Check table 9
8005	RO	unsigned	Channel records total numbers	0~200 0: no record 1~200: records total numbers
8006	RW	unsigned	Start item	1~200
8007	RO	unsigned	read	

Note: 8001~8004 can write when enter user mode, administrator mode or factory mode.

Demand record read steps:

1. Write “to be operated channel no. ”
2. Read “channel records total number”
3. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
4. Send “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N demand records need to be read, N≤15. The length of 1

record is 16 bytes. For detail, pls check table 4).

5. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 4 to realize continuous read, and no need to update “start item” manually.

Table 7: Demand carrier

No.	Demand name	1P2W	3P3W	3P4W
9	Phase A active power	✔	✔	✔
10	Phase B active power			✔
11	Phase C active power		✔	✔
12	Total active power		✔	✔
13	Phase A reactive power	✔	✔	✔
14	Phase B reactive power			✔
15	Phase C reactive power		✔	✔
16	Total reactive power		✔	✔
17	Phase A apparent power	✔	✔	✔
18	Phase B apparent power			✔
19	Phase C apparent power		✔	✔
20	Total apparent power		✔	✔

Table 8: Demand calculation interval

No.	Demand calculation interval (Unit: minute)
0	1
1	2
2	5
3	10
4	15
5	20
6	30
7	60
8	120
9	180
10	240
11	360
12	480
13	720
14	1440

Table 9: Demand record interval

No.	Demand record interval
0	1hour
1	2 hours
2	3 hours
3	6 hours
4	12 hours
5	18 hours
6	1 day
7	1 week
8	1 month

Table 10: 1 demand record format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
year	month	day	hour	minute	second	Demand value (double)								carrier	

Note: For power type demand, the unit is W, var, or VA.

11. Energy freeze parameter and record register

Register (HEX)	Read/ write	Type	Description	Remark
9000	RW	unsigned	To be operated channel no.	1~50
9001	RW	unsigned	Channel enable switch	0: close the channel 1: start the channel
9002	RW	unsigned	Carrier	Check table 11
9003	RW	unsigned	Record interval	Check table 12
9004	RO	unsigned	Channel records total number	0~200
9005	RW	unsigned	Start item	1~200
9006	RO	unsigned	read	

Note: 9001~9003 can write when enter user mode, administrator mode or factory mode.

Energy freeze record read steps:

1. Write “to be operated channel no. ”
2. Read“channel records total numbers”
3. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
4. Write “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N records need to be read, N≤15. The length of 1 record is 16 bytes. For detail, pls check table 13).
5. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 4 to realize continuous read, and no need to update “start item” manually.

Table 11: **Freeze energy** carrier

No.	**Freeze data name**	**No.**	**Freeze data name**	**No.**	**Freeze data name**
0	Input total active energy	15	Phase C output reactive energy	30	Tariff 3 input active energy
1	Output total active energy	16	Total apparent energy	31	Tariff 4 input active energy
2	Phase A input active energy	17	Phase A apparent energy	32	Tariff 1 input reactive energy
3	Phase B input active energy	18	Phase B apparent energy	33	Tariff 2 input reactive energy
4	Phase C input active energy	19	Phase C apparent energy	34	Tariff 3 input reactive energy
5	Phase A output active energy	20	Total net active energy	35	Tariff 4 input reactive energy
6	Phase B output active energy	21	Phase A net active energy	36	Tariff 1 output active energy
7	Phase C output active energy	22	Phase B net active energy	37	Tariff 2 output active energy
8	Input total reactive energy	23	Phase C net active energy	38	Tariff 3 output active energy
9	Output total reactive energy	24	Total net reactive energy	39	Tariff 4 output active energy
10	Phase A input reactive energy	25	Phase A net reactive energy	40	Tariff 1 output reactive energy
11	Phase B input reactive energy	26	Phase B net reactive energy	41	Tariff 2 output reactive energy
12	Phase C input reactive energy	27	Phase C net reactive energy	42	Tariff 3 output reactive energy
13	Phase A output reactive energy	28	Tariff 1 input active energy	43	Tariff 4 output reactive energy
14	Phase B output reactive energy	29	Tariff 2 input active energy	44	

No.	OBIS	1P2W	3P3W	3P4W
0	Input total active energy		✔	✔
1	Output total active energy		✔	✔
2	Phase A input active energy	✔	✔	✔
3	Phase B input active energy			✔
4	Phase C input active energy		✔	✔
5	Phase A output active energy	✔	✔	✔
6	Phase B output active energy			✔

7	Phase C output active energy		✔	✔
8	Input total reactive energy		✔	✔
9	Output total reactive energy		✔	✔
10	Phase A input reactive energy	✔	✔	✔
11	Phase B input reactive energy			✔
12	Phase C input reactive energy		✔	✔
13	Phase A output reactive energy	✔	✔	✔
14	Phase B output reactive energy			✔
15	Phase C output reactive energy		✔	✔
16	Total apparent energy		✔	✔
17	Phase A apparent energy	✔	✔	✔
18	Phase B apparent energy			✔
19	Phase C apparent energy		✔	✔
20	Total net active energy		✔	✔
21	Phase A net active energy	✔	✔	✔
22	Phase B net active energy			✔
23	Phase C net active energy		✔	✔
24	Total net reactive energy		✔	✔
25	Phase A net reactive energy	✔	✔	✔
26	Phase B net reactive energy			✔
27	Phase C net reactive energy		✔	✔
28	Tariff 1 input active energy	✔	✔	✔
29	Tariff 2 input active energy	✔	✔	✔
30	Tariff 3 input active energy	✔	✔	✔
31	Tariff 4 input active energy	✔	✔	✔
32	Tariff 1 input reactive energy	✔	✔	✔
33	Tariff 2 input reactive energy	✔	✔	✔
34	Tariff 3 input reactive energy	✔	✔	✔
35	Tariff 4 input reactive energy	✔	✔	✔
36	Tariff 1 output active energy	✔	✔	✔
37	Tariff 2 output active energy	✔	✔	✔
38	Tariff 3 output active energy	✔	✔	✔
39	Tariff 4 output active energy	✔	✔	✔
40	Tariff 1 output reactive energy	✔	✔	✔

41	Tariff 2 output reactive energy	✔	✔	✔
42	Tariff 3 output reactive energy	✔	✔	✔
43	Tariff 4 output reactive energy	✔	✔	✔

Table 12: Energy freeze interval

No.	Energy freeze data storage interval
0	1 day
1	1 week
2	1 month

Table 13: 1 energy freeze record format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
year	month	day	hour	minute	second	Energy value(double)								OBIS	

Note: real energy value = register value. Unit is Wh, varh, or Vah.

Table 12: Load curve parameters and record register

Register (HEX)	**Read/ write**	**Type**	**Description**	**Remark**
A000	RW	unsigned	To be operated channel no.	1~16
A001	RW	unsigned	Channel enable switch	0: close the channel 1: start the channel
A002	RW	unsigned	Carrier	Check table 14
A003	RW	unsigned	Record interval	Check table 15
A004	RO	unsigned	Channel records total number	0~2000
A005	RW	unsigned	Start item	1~2000
A006	RO	unsigned	read	

Note:A001~A003 can write when enter user mode, administrator mode or factory mode.

Load curve record read steps:

1. Write “to be operated channel no. ”
2. Read“channel records total numbers”
3. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
4. Write “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N records need to be read, N≤15. The length of 1 record is 16 bytes. For detail, pls check table 16).
5. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 4 to enable continuous reading, and no need to update “start item” manually.

Table 14: 37 items loads

No.	Load	No.	Load	No.	Load
0	Phase A voltage	13	Phase A input active energy	26	Phase B output reactive energy
1	Phase B voltage	14	Phase B input active energy	27	Phase C output reactive energy
2	Phase C voltage	15	Phase C input active energy	28	Total output active energy
3	Phase AB voltage	16	Total input active energy	29	Phase A apparent energy
4	Phase BC voltage	17	Phase A output active energy	30	Phase B apparent energy
5	Phase AC voltage	18	Phase B output active energy	31	Phase C apparent energy
6	Phase A current	19	Phase C output active energy	32	Total apparent energy
7	Phase B current	20	Total output active energy	33	Phase A power factor
8	Phase C current	21	Phase A input reactive energy	34	Phase B power factor
9	Neutral current	22	Phase B input reactive energy	35	Phase C power factor
10	Total active power	23	Phase C input reactive energy	36	Total power factor
11	Total reactive power	24	Total input reactive energy		
12	Total apparent power	25	Phase A output reactive energy		

No.	OBIS	1P2W	3P3W	3P4W
0	Phase A voltage	✔		✔
1	Phase B voltage			✔
2	Phase C voltage			✔
3	Phase AB voltage		✔	✔
4	Phase BC voltage		✔	✔
5	Phase AC voltage		✔	✔
6	Phase A current	✔	✔	✔
7	Phase B current		✔	✔
8	Phase C current		✔	✔
9	Neutral current			✔
10	Total active power	✔	✔	✔
11	Total reactive power	✔	✔	✔
12	Total apparent power	✔	✔	✔
13	Phase A input active energy	✔	✔	✔
14	Phase B input active energy			✔
15	Phase C input active energy		✔	✔

16	Total input active energy		✔	✔
17	Phase A output active energy	✔	✔	✔
18	Phase B output active energy	✔		✔
19	Phase C output active energy		✔	✔
20	Total output active energy		✔	✔
21	Phase A input reactive energy	✔	✔	✔
22	Phase B input reactive energy	✔		✔
23	Phase C input reactive energy		✔	✔
24	Total input reactive energy		✔	✔
25	Phase A output reactive energy	✔	✔	✔
26	Phase B output reactive energy			✔
27	Phase C output reactive energy		✔	✔
28	Total output active energy		✔	✔
29	Phase A apparent energy	✔	✔	✔
30	Phase B apparent energy			✔
31	Phase C apparent energy		✔	✔
32	Total apparent energy		✔	✔
33	Phase A power factor	✔	✔	✔
34	Phase B power factor			✔
35	Phase C power factor		✔	✔
36	Total power factor		✔	✔

Table 15: Load curve record interval

No.	Load curve record interval (Unit: minute)
0	1
1	2
2	5
3	10
4	15
5	20
6	30
7	60
8	120
9	180
10	240
11	360
12	480
13	720
14	1440

Table 16: 1 load curve record format

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
year	month	day	hour	minute	second	Load value (double)								OBIS	

Note: For voltage load value, unit is V;
For current load value, unit is A;
For power load value, unit is W, var, or VA;
For energy load value, unit is Wh, varh, Vah;
For power factor load value, no unit

13. System log register

Register (HEX)	Read/write	Type	Description	Remark
B000	RO	unsigned	Effective records total numbers	0~500
B001	RW	unsigned	Start item	1~500
B002	RO	unsigned	Read	

System log read steps:
1. Read “effective records total numbers”
2. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
3. Write “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N records need to be read, N≤15. The length of 1 record is 16 bytes. For detail, pls check table 17).
4. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 3 to realize continuous read, and no need to update “start item” manually.

Table 17: 1 system log storage format

0	1	2	3	4	5	6	7 ~ 10	11~15
year	month	day	hour	minute	second	Log code (Table 20)	Cleared channel No.(unsigned)	Remain

Table 18: System log code

Code	Content	Data
33	Power off	---
34	Power on	---
35	Clock change	---
36	Wiring change	---
37	CT change	---
38	PT change	---
39	485 address change	---

Code	Content	Data
40	485 baud rate change	---
41	485 parity bit change	---
42	FLASH storage mode change	---
43	Active energy clearing operation	---
44	Reactive energy clearing operation	---
45	Apparent energy clearing operation	---
46	Quadrant energy clearing operation	---
47	Tariff energy clearing operation	---
48	All energy clearing operation	---
49	Demand clearing operation	Cleared channel No.
50	Energy freezeclearing operation	Cleared channel No.
51	Load curve clearing operation	Cleared channel No.
52	System log clearing operation	---
53	Event log clearing operation	---
54	Quality log clearing operation	---
55	Alarm numbers clearing operation	---
56	External status numbers clearing operation	---
57	All energy, demand, energy freeze, load curve, logs clearing operation	---

14. Event log register

Register (HEX)	Read/ write	Type	Description	Remark
B100	RO	unsigned	Effective records total numbers	0~500
B101	RW	unsigned	Start item	1~500
B102	WO	unsigned	Read	

Event log read steps:

1. Read “effective records total numbers”
2. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
3. Write “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N records need to be read, N≤15. The length of 1 record is 16 bytes. For detail, pls check table 19).
4. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 3 to realize continuous read, and no need to update “start item” manually.

Table 19: 1 event log storage format

0	1	2	3	4	5	6	7 ~ 10	11	12~15
year	month	day	hou r	minute	second	Log code (Table 20)	Alarm value (float)	0 upper limit; 1 lower limit	

Note: For current alarm data, unit is A;
For power alarm data, unit is W, var, VA;
For power factor alarm data, no unit

Table 20: Event log code

Code	Content	Code	Content	Code	Content
6	Phase A current alarm	14	Total reactive power alarm	22	Total power factor alarm
7	Phase B current alarm	15	Phase A reactive power alarm	23	Phase A power factor alarm
8	Phase C current alarm	16	Phase B reactive power alarm	24	Phase B power factor alarm
9	Neutral current alarm	17	Phase C reactive power alarm	25	Phase C power factor alarm
10	Total active power alarm	18	Total apparent power alarm		
11	Phase A active power alarm	19	Phase A apparent power alarm		
12	Phase B active power alarm	20	Phase B apparent power alarm		
13	Phase C active power alarm	21	Phase C apparent power alarm		

15. Power quality log register

Register (HEX)	Read/ write	Type	Description	Remark
B200	RO	unsigned	Effective records total numbers	0~500
B201	RW	unsigned	Start item	1~500
B202	WO	unsigned	Read	

Power quality log read steps:

1. Read “effective records total numbers”
2. Write“Start item”, the default of power on is 1, “item 1” means the newest record.
3. Write “read” command, in the Modbus command, pls write the data length which need to be read in the form of N*8 (N refers to N records need to be read, N≤15. The length of 1 record is 16 bytes. For detail, pls check table 21).
4. After finishing “read”, “start item” register will update to the serial No. of next unread record. The user can repeat step 3 to realize continuous read, and no need to update “start item” manually.

Table 21: 1 power quality log storage format

0	1	2	3	4	5	6	7 ~ 10	11	12~15
year	month	day	hour	minute	second	Log code (table 20)	Alarm value (float)	0 upper limit; 1 lower limit	

Note: For voltage data, unit is V;

For harmonic distortion data, unit is actual content value.

Table 22: Power quality log code

Code	Content
0	Phase A voltage alarm
1	Phase B voltage alarm
2	Phase C voltage alarm
3	Phase AB voltage alarm
4	Phase BC voltage alarm
5	Phase AC voltage alarm
26	Phase A voltage total harmonic distortion alarm
27	Phase B voltage total harmonic distortion alarm
28	Phase C voltage total harmonic distortion alarm
29	Phase A lack of phase
30	Phase B lack of phase
31	Phase C lack of phase
32	Frequency unstable

16. Clearing operation register

Register (HEX)	Read/ write	Type	Description		Remark
C000	WO	unsigned	Remain		
C001	WO	unsigned	IO1	Counter clearing	Write 1 clearing
C002	WO	unsigned	IO2		Write 1 clearing
C003	WO	unsigned	IO3		Write 1 clearing
C004	WO	unsigned	IO4		Write 1 clearing
C005	WO	unsigned	Active	Energy clearing	Byte 0: 0x55 byte 1: 0x11
C006	WO	unsigned	Reactive		Byte 0: 0x55 byte 1: 0x22
C007	WO	unsigned	Apparent		Byte 0: 0x55 byte 1: 0x33
C008	WO	unsigned	Quadrant		Byte 0: 0x55 byte 1: 0x44
C009	WO	unsigned	Tariff		Byte 0: 0x55 byte 1: 0x55
C00A	WO	unsigned	All energy		Byte 0: 0x55 byte 1:0x66
C00B	WO	unsigned	Single channel	Demand channel clearing	Byte 0: 0x55 byte 1: channel No.

C00C	WO	unsigned	All		Byte 0: 0x55 byte 1: 0x77
C00D	WO	unsigned	Single channel	Energy freeze channel clearing	Byte 0: 0xAA byte 1: channel No.
C00E	WO	unsigned	All		Byte 0: 0x55 byte 1: 0x77
C00F	WO	unsigned	Single channel	Load curve clearing	Byte 0: 0x5A byte 1: channel No.
C010	WO	unsigned	All		Byte 0: 0x55 byte 1: 0x77
C011	WO	unsigned	System log	Logs clearing	Byte 0: 0x55 byte 1: 0x88
C012	WO	unsigned	Event log		Byte 0: 0x55 byte 1:0x99
C013	WO	unsigned	Quality log		Byte 0: 0x55 byte 1: 0xAA
C014	WO	unsigned	All above data		Byte 0: 0x55 byte 1: 0xBB

* Register in this group, the user need to enter administrator mode or factory mode to operate.

Technical Support:

If you have any questions, please read user manual first carefully. If you can not find the answers in the user manual, you can contact our technicalsupporters. Besides, you also can download data and contact us through our website.

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