AcuRev 1300

3P4W Energy Meter
User's Manual

ACCUENERGY

The information contained in this document is believed to be accurate at the time of publication, however, Accuenergy assumes no responsibility for any errors which may appear here and reserves the right to make changes without notice. Please ask the local representative for latest product specifications before ordering.

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Please read this manual carefully before installation, operation and maintenance of AcuRev 1300 series meter. The following symbols in this manual are used to provide warning of danger or risk during the installation and operation of the meters.

Electric Shock Symbol: Carries information about procedures which must be followed to reduce the risk of electric shock and danger to personal health.

Safety Alert Symbol: Carries information about circumstances which if not considered may result in injury or death.

Prior to maintenance and repair, the equipment must be de-energized and grounded. All maintenance work must be performed by qualified, competent accredited professionals who have received formal training and have experience with highvoltage and currentdevices. Accuenergy shall not be responsible or liable for any damages or injuries caused by improper meter installation and/or operation.

Content

Welcome to AcuRev 1300!

You have purchased an advanced, versatile, multifunction power meter.

Please note the following chapter descriptions in order to utilize the power meter properly.

Chapter 1 Introduces the basic AcuRev 1300 features and application areas.

Chapter 2 Introduces AcuRev 1300 installation and wiring methods in detail.

Chapter 3 walks through how to operate AcuRev 1300 via the display panel, display measurement data and parameter settings.

Chapter 4 introduces main functions with the included software.

Chapter 5 introduces communication related informations, including communication protocol format and parameter address table.

Appendix provides AcuRev 1300 technical specifications and ordering information.

Chapter 1 Introduction

1.1 Meter Overview

AcuRev 1300 series rail-mounted three phase energy Meters has a small size and high accuracy, it is ideal for use in distributor and tight spaces. The meter is equipped with an easy to read liquid crystal display (LCD) which displays all the important information. It is ideal for building energy management systems, energy monitoring and energy metering systems.

- **Energy**

AcuRev1300 series support Bi-directional active energy measurements; Two-way reactive power energy metering, four quadrant reactive power energy metering; Two-way apparent energy metering; The cumulative energy metering (Energy Import + Energy Export); Net energy metering (input power - power output); Support rate 4 electric energy metering.

- **Measurement fuction**

AcuRev 1300 series meters provide measurement and indication functions. Which can measure Voltage, Current, Power, Frequency and Power Factor. And which also have load characteristics indication function. Line current measurement ,The calculation of zero sequence current.Different specifications of the meters have different functions.

- **Demand**

This product provides demand forecasting demand measurement and demand climax of Current, Active Power, Reactive Power and Apparent Power.

- **System Event Logging**

The product can record the time and event ID about some important parameter amendment or clearance.

- Running time detection

Support instrument running time of detection and instructions.

- Instrument operation temperature indication

Provide instrument internal temperature indicator

- Alarm function

Support multiple parameter data detection alarm, and can be configured to RO output.

- **Communication**

Supports RS485 communication open protocol and infrared interface. Support Modbus RTU. Infrared interface supports the on spot infrared meter reading.

1.2 Areas of Application

Large commercial center	Rail transport
School	Public facilities
Hotels and Buildings	Smart distribution cabinet
Smart building system	Energy management system
Industrial environment	Energy saving system

1.3 Product Features

- **Multifunction, high accuracy**

AcuRev 1300 series meter has data collection and management function, energy measurement and multi-parameters measurement function, and demand measurement, event logging.

The measurement accuracy of energy, power, voltage, current is 0.5.

- **Small size, convenient installation**

AcuRev 1300 series product appearance and dimension fits the IEC 35mm DIN standard, accounts for only 6 mold.

- **Display is clear**

The LCD display is very clear. All measurement parameters could be search through the display easily. The parameter could be set through the display. LCD display has backlight support, which can help users use it in wake light environment.

- **Safety**

AcuRev 1300 series product has electronic sealing function and physical sealing. Users cannot change the parameters through the keys when the electronic sealing closed, and important parameters cannot be changed through communication, preventing maliciousdata changement.

- Convenient wiring

Both high pressure system and low pressure systems, both three-phase three-wire system and three-phase four-wire system, can choose the appropriate wiring way connected to AcuRev1300 series instrument.Almost all of the three-phase system application, and can be used for single phase system.

- Connection error automatic judgment

AcuRev 1300 series instrument connection errors of judgment and help in the process of the project construction cost increase caused by the wrong wiring.

Chapter 2 Installation

Before Installtion

◘ The installation must be perfomred by qualified, competent accredited professionals who have received formal training and have experience with high voltage and current devices. Appropriate safety wear (gloves, glasses, arc flush suit, etc.) is mandatory to ensure safe installation.

◘ During normal meter operation, caution should be used when handling the following as high voltage may be present: Terminal Blocks, Current Transformer connection nodes, Potential Transformer connection nodes and the related circuits. All primary and secondary circuits may contain lethal current and voltage. Contact with current channels must be avoided.

◘ The power meter and I/O modules cannot be installed on the primary side of transformers or where VA has limitations. The power meter can be only installed on the secondary side. Avoid contact with meter terminals after the completion of installtion.

◘ Do not input voltage above the rated maximum limit of the power meter and devices connected to it. Before energizing the meter, please refer to the meter's label and specifications.

◘ Do not perform high voltage test / insulation experiment to output, input or communication terminals.

◘ The use of shorting blocks and fuses are recommended. Current transformers need to be grounded.

◘ Use dry cloth to wipe the meter.

◘ The replace of the Battery must be performed by professionals.

This chapter mainly described how to install an AcuRev 1300 series meter, which is a very important step of using the meter correctly. This chapter gives some pictures about how to install the meter and some notes. Before installing the meter, please read this first.

2.1 Appearance and Dimensions

Appearance:

Figure 2-1 AcuRev 1300 Appearance

Dimensions:

Unit: mm

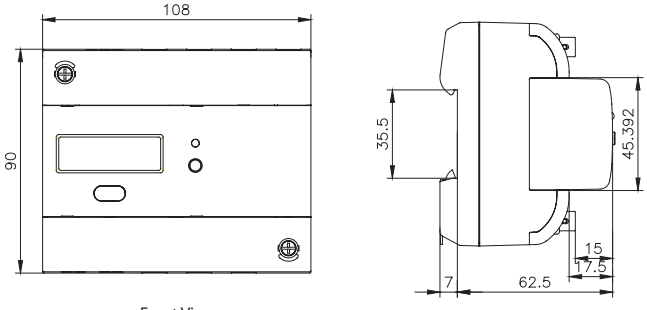


Figure 2-2 Meter base dimensions

2.2 Installation Methods

Note

Temperature and humidity of the environment must accord with the requirement of acurev 1300, Otherwise it may cause the meter damaged.

Environmental

Before installation, please check the environment, temperature and humidity to ensure theAcuRev 1300 series meter is being placed where it will not be damaged.

1. Temperature

AcuRev 1300 operating temperature is -25~70℃. Exceeding this temperature range will cause damage to the meter. Please note that it can influence the meter life negatively if themeter operates in extremely high or extremely low temperatures. AcuRev 1300 storage temperature range is -40~85℃.

2. Humidity

5% to 95% non-condensing.

3. Location

AcuRev1300 series meter should be installed in a dry and dust free environment. Avoidexposing meter to excessive heat, radiation and high electrical noise sources.

Installation Steps:

This product is DIN railed mounted and fits on the standard 35mm rail.

1. To install the meter on the rail insert the top of the rail into the groove on the back of the meter.Pull the metal clips back and slide the rail across the groove of the meter.

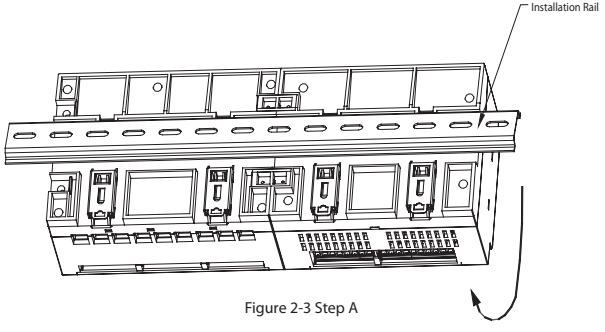


Figure 2-3 Step A

2. Use the metal clips to tighten the rail to complete installation.

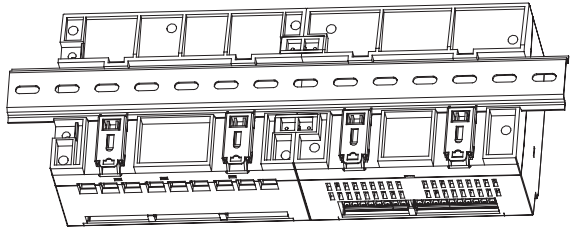


Figure 2-4 Step B

3. Before mentioning this step, the steps needed to remove the seal/cover need to be mentioned. I.E. Step 5 below should come first.To attach seal/cover back onto the meter place the left side of the cover down onto meter and press down on the right side. When installed correctly you will hear a clicking sound.The steps to attach the other cover is opposite to the above step.

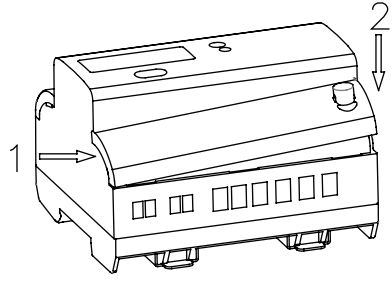


Figure 2-5 Step C

4. After inserting the cover, tighten the sealing screws and lay the seal and tighten the sealing screws, lay the seal.

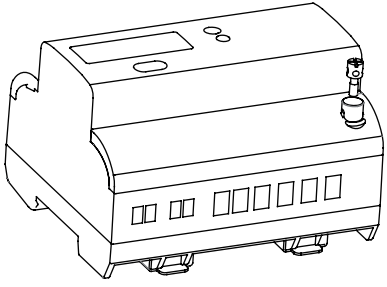


Figure 2-6 Step D

5. To open the cover, remove the seal if applicable, unscrew the sealing screws and life the cover upwards to remove.

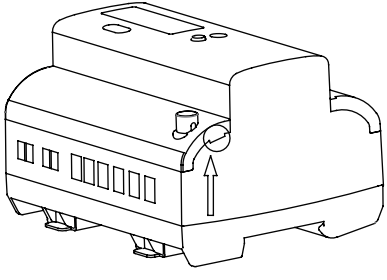


Figure 2-7 Step E

2.3 Wiring

Terminals:

This manual use L1 L2 L3 to represent three-phase current loop, which are the same as A, B, C in other manuals.

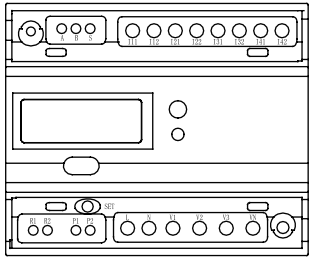


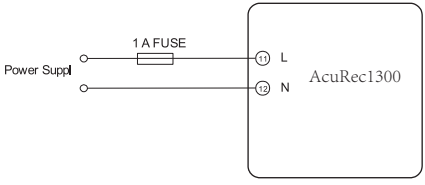
Figure 2-8 The transformer AcuRev1300 terminal access type distribution

A, B, S: communications terminal; P1, P2: pulse output;

L, N: auxiliary power; V1, V2, V3 and.Vn: voltage circuit; I11, I12, I21 I22, I31, I32, I41, I42: current loop; R1, R2: RO output.

AuxiliaryPower Supply:

AcuRev1300 series instrument power supply: ac 100 ~ 415 vac, 50/60 hz, or dc 100-300 VDC, can be used throughout the world. Other power supply voltage selection please contact manufacturers. Instrument in the typical working conditions of power consumption is very small, so the power supply can by independent power supply, can also be obtained from circuit under test.Suggested that under the condition of power voltage fluctuation is bigger, use the voltagee stabilizer. Power supply terminals, respectively is: L, N. The typical auxiliary power wiring is as follows:



Choice of wire of power supply is AWG22-16 or 0.6-1.5mm2.

A fuse (typical 1A/250Vac) or small air circuit breaker should be used in the auxillary power supply loop. Such as the use of small air circuit breaker, it is recommended to use IEC947 standards and through the CE certification of products. An isolated transformer or EMC filter should be used in the control power supply loop if there is a power quality problem in the power supply.

Note: the power before wiring, please confirm that the current power supply and instrument brand logo on the power supply voltage is up!

Voltage Input:

Maximum input voltage for the AcuRev1300 series meter shall not exceed 400LN/690LL VAC rms for three phase or 400LN VAC rms for single phase. Voltage input signal circuit must be installed in the air circuit breaker, fuse or small suggestion with 1 a fuse.

Potential Transformer (PT) must be used for high voltage systems. Typical secondary output for PTs shall be 100V or 120V. Please make sure to select an appropriate PT to maintain the measurement accuracy of the meter. When connecting using the star configuration wiring method, the PT's primary side rated voltage should be equal to or close to the phase voltage of the system to utilize the full range of the PT. When connecting using the delta configuration wiring method, the PT's primary side rated voltage should be equal to or close to the line voltage of the system. A fuse (typical 1A/250Vac) should be used in the voltage input loop. The wire for voltage input is AWG16-12 or 1.3-2.0mm2.

Note: In no circumstance should the secondary of the PT be shorted. The secondary of the PT should be grounded at one end. Please refer to the wiring diagram section for further details.

Current Input:

Current Transformers (CTs) are required in most engineering applications. Typical current rating for the secondary side of the CT shall be 5A (standard) or 1A (Optional), please refer to the ordering information appendix for further details. CTs must be used if the system rated current is over 5A. The accuracy of the CT should be better than 0.5% with rating over 3VA is recommended in order to preserve the meter's accuracy. The wire between CTs and the meter shall be as short as possible. The length of the wire have an effect on the accuracy.The wire size of current input is AWG15-10 or 1.5-2.5mm2.

Note: The secondary side of the CT should not be open circuit in any circumstance when the power is on. There should not be any fuse or switch in the CT loop. One end of the CT loop should be connected to the ground.

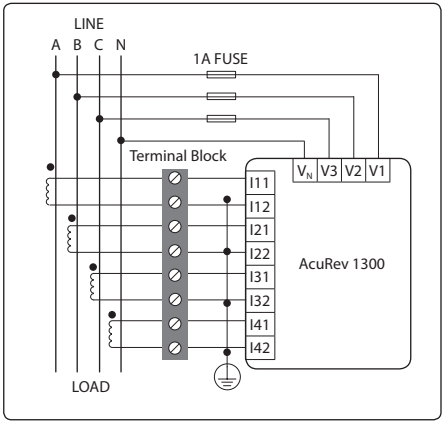
Vn Connection:

Vn is the reference point of the Acuvim II series meter voltage input. Low wire resistance helps improve the measurement accuracy. Different system wiring modes require different Vn connection methods. Please refer to the wiring diagram section for more details.

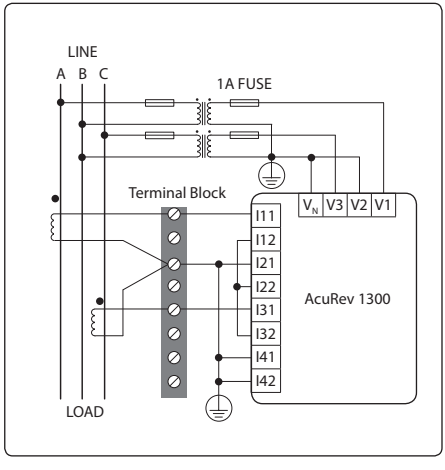
AcuRev1300 series instrument measuring wiring method AcuRev1300 series instrument can satisfy almost any kind of three phase wiring diagrams. Please read this section carefully before choosing the suitable wiring method for your power system. Please make sure the rated voltage grade and PT secondary side voltage is suitable for the current models of AcuRev1300 series. Current rating and CT secondary side current rating is suitable for the current models of AcuRev1300 series.

AcuRev1300 series instrument connection mode Settings and the corresponding practical application in engineering and correct, to ensure the measurement accuracy of instrument.

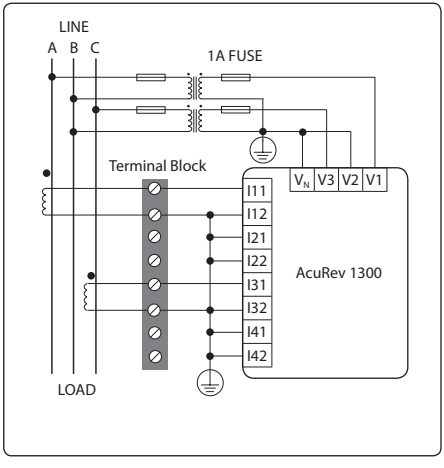
1). 3LN, 3CT; The connection mode set to 3LN



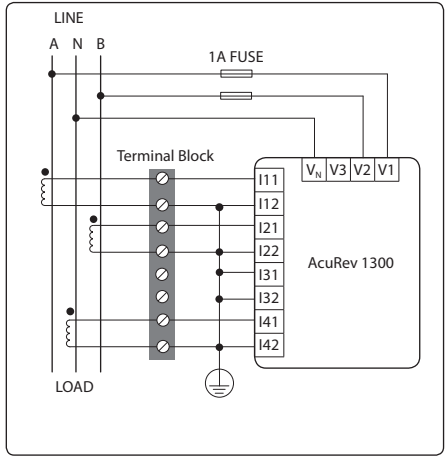
2). 2LL,3CT (using 2CT); The connection mode is set to 2LL; Note: output transformer secondary side is 5A/1A



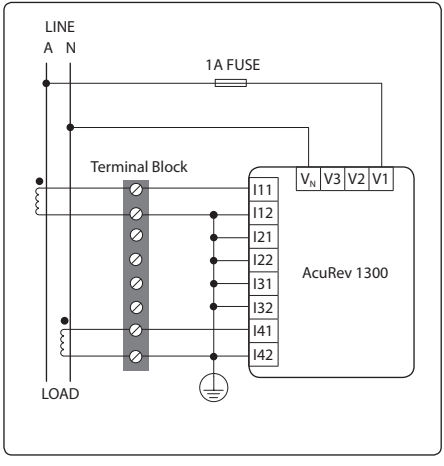
3). 2LL,2CT;The connection mode is set to 2LL; Note: mutual inductance type secondary side output for 5A/1A,Rogowski coil 333mV,200mA



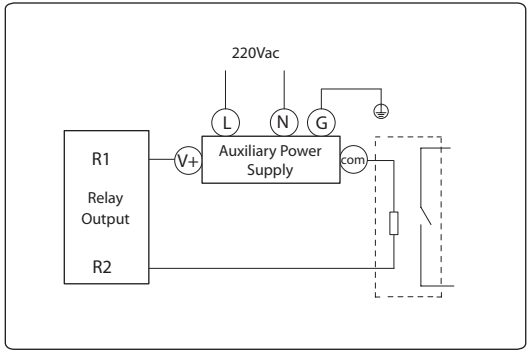
4). 1LL , 2CT; the connection mode is set to 1LL.



5) 1LN, 1CT; connection mode is set to 1LN



Relay output wiring diagram



AcuRev1300 communication utilizes RS485 port, via Modbus-RTU protocol. The wiringterminals are A, B, S. "A" is called differential signal " ", "B" is called differentialsignal"-", "S" is connected to the shielding of shielded twisted pair cable. The maximumdistance of Shielded Twisted Pair cable is 1200 m. The distance will be shorter if moredevices are on the same communication link or using a higher baud rate.

If the master device does not have RS485 but RS232 port, a RS232/485 converter can beutilized. Typical RS485 network topologies include line, circle and star.

In order to improve communication quality, please pay attention to:

1. High-quality Shielded Twisted Pair cable is very important, AWG22 (0.6mm2) or lower isrecommended. Two cables should be different colors.

2. Pay attention to "single point earthing". It means there is only one point of the shieldingconnected to ground in a single communication link.

3. Every A(+) should be connected to A(+), B(-) to B(-), or it will influence the network, evendamage the communication interface.

4. "T" type connection topology should be avoided. This means no new branches exceptfrom the starting point.

5.Keep communication cables away as much as possible from sources of electrical noise.When several devices are connected (daisy chain) to the same long communication line, ananti signalrefecting resistor (typical value 120- 300Ohm, 0.25W) is often used at the endof the circuit (the last meter of the chain) if the communication quality is distorted.

6. Use RS232/RS485 or USB/RS485 converter with optical isolated output and surge protection.

7. A infrared port is also available in the Display Module, which supports meterreading.

Chapter 3 Operation and Application

In this chapter, you would see some details about human-computer interaction, including how to use the key to browse demanded information, and how to set the parameters correctly.

3.1 Display Panel and Keys

Chapter 2.1 shows the dimensions of Display Module. It consists of one LCD screen and one key. To make the description clearly, all of the chars and number segments are lighten in the picture below, but when we use it , they would not appear in one page.

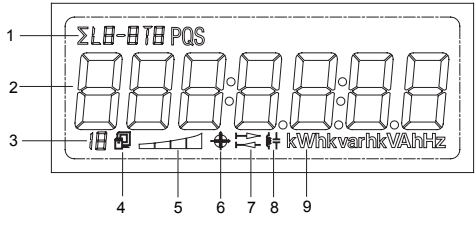


Figure 3-1 All LCD display lighten

Table 3-1 Display of content

NO.	Content	Description
1	Description area	To display what kind of parameter in the display area. To distinguish the power of conjunction, split phase, current, demand, parameter Settings, and so on.
2	Measurement parameter display area 7 decimal point, time signal	To display the main measurement parameters: Energy, Voltage, Current, Power, Frequency, Demand, Settings, Time.
3		Indicate the all information mode
4	Communication icon	No icon: no communication; One icon: query sent Two icons: query sent and response received
5	Load size icon	Display in the analog way according to the load frequency

6	 Four-quadrant reactive power display	To indicate the first to forth quadrant reactive power
7		Import icon on: display the Energy Import Export icon on: display the Energy Export
8	 Load character indicate	Inductance icon on: inductive load Capacitor icon on: capacitive load
9	unit	Unit of the parameter in parameter display area

3.2 Display Mode and Key Operations

The LCD display consists of important parameter display mode, all parameter display mode and setting mode.

1. Important parameter display mode

The important parameter display area mode mainly display the important parameters, including system default display data and custom data. Each page display lasts about 6 seconds. When we press "SCROLL" in a short time, the current screen content would be locked for 1 minute and light up the backlight, during this time, press the same key in the same way another time, it would turn to the next page and lock the display for 1 minute; when we didn't press any key for one minute, then it would display all the pages in a rate of 6 second per page automatically.

System default display content:

A) the input active power (AcuRev1301 ~ AcuRev1304 support)

B) the output active power (AcuRev1302 ~ AcuRev1304 support)

Custom data content: The 11^{th} -42^{th} screen data could be set to important parameter display mode, and be cycle displayed. See table 3-2 Display coding table.

Note:

Configuration 1: using the communication way , we could add 1 to the corresponding

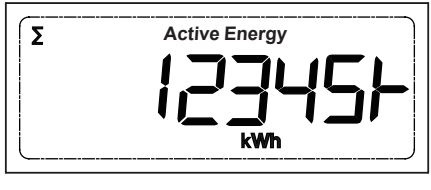
flag, the consequence would be added to the important parameter display area to cycle display. The corresponding flag would be cleared and expelled from important parameters. System default display data content cannot be deleted.Configuration 2: add or delete the corresponding number through pressing keys.

AcuRev1300 instrument power value is positive.The number of significant digits when electricity data (including the number of decimal places) less than 7, normal display; When effective digit is greater than 7, the data in "thousand", for display.

2. All parameters display mode

AcuRev1300 instrument power value is positive.The number of significant digits when electricity data (including the number of decimal places) less than 7, normal display; When effective digit is greater than 7, the data in "thousand", for display.

AcuRev1300 instrument real-time measurements showed that when the data is less than 9999.9, normal, according to data accurate to one decimal places.When the data is greater than 9999.9, no longer show decimal places, integer bit in thousands of units for display.For example: 12345.6, shows 12 k.Does not distinguish between display all of the information and the important parameters.



All of the meter supported parameters display are in the table below:

Table 3-2 Display coding table

Page	No.	Setting flag	Content	Model 1	Model 2	Model 3	Model 4
1			Voltage wiring detection	√	√	√	√
2			Current connection detection	√	√	√	√
3			Instrument address	√	√	√	√
4			RS485 communication baud rate		√	√	√
5			RS485 communication way of checking		√	√	√
6			Hardware version	√	√	√	√
7			Software version	√	√	√	√
8			The release date	√	√	√	√
9			specifications	√	√	√	√
10			The input active power	√	√	√	√
11-13	1	optional display flag word1 - Bit0	The input active power (A - C)	√	√	√	√
14-16	8	optional display flag word1 - Bit7	The voltage (A - C)	√	√	√	√
17-19	9	optional display flag word1 - Bit8	Current phase (A - C)	√	√	√	√
20	10	optional display flag word1 - Bit9	Line current	√	√	√	√
21	11	optional display flag word1 - Bit10	The system active power	√	√	√	√
22-24	12	optional display flag word1 - Bit11	Shunt active power	√	√	√	√
25	16	optional display flag word1 - Bit15	frequency	√	√	√	√
26	17	optional display flag word2 - Bit0	The temperature	√	√	√	√

27	20	optional display flag word2 - Bit3	Meter run time	√	√	√	√
28	21	optional display flag word2 - Bit4	Load running time	√	√	√	√
29			end				

3. Setting mode

Short press the "set" key, we'll go into the setting mode: password authentication. When it is succeed then go to the address setting page, or drop out of the setting mode and go to the important parameter setting mode; when the sealing key detected is closed, it will drop out of the setting mode automatically. 1min after the last press, it will drop out of the current mode. Long time press the "SCROLL" key would drop out of the setting mode. The default password is 0000

Table 3-3 Set interface coding table

Content	Specification 1	Specification 2	Specification 3	Specification 4	Specification 5
Meter address	S-01	S-01	S-01	S-01	S-01
Baud rate		S-02	S-02	S-02	S-02
Check mode		S-03	S-03	S-03	S-03
Energy pulse value option	-	S-04	S-04	S-04	S-04
reactive calculation		S-05	S-05	S-05	S-05
Change password	S-02	S-06	S-06	S-06	S-06
Measuring side set	S-03	S-07	S-07	S-07	S-07
Connection mode	S-04	S-08	S-08	S-08	S-08
CT2	S-05	S-09	S-09	S-09	S-09
CT1	S-06	S-10	S-10	S-10	S-10
PT2	S-07	S-11	S-11	S-11	S-11
PT1	S-08	S-12	S-12	S-12	S-12
The pulse constant	S-09	S-13	S-13	S-13	S-13
The pulse width	S-10	S-14	S-14	S-14	S-14
Decimal digits	S-11	S-15	S-15	S-15	S-15

Display interface customization:increases	S-12	S-16	S-16	S-16	S-16
Display interface customization: cut	S-13	S-17	S-17	S-17	S-17
Incorrect connection detection enable	S-14	S-18	S-18	S-18	S-18

Each mode display area distinction as follows:

Important parameter mode: The first  in the first row do not display s, at the same time, the mode setting position do not display in the last row.

All parameter mode: The first  in the first row do not display s, at the same time, the mode setting position display in the last row.

Setting mode: The first  in the first row display s, at the same time, the mode setting position do not display in the last row.

Keys presentation:

1. Sealing key: Used as electronic sealing function.

2. Set key(SET): Used as LCD parameter setting.

According to the pressing time, there are 2 kinds of function:

A) Short time press (Set) (the press time is shorter than 2 second)

Used to enter the setting mode, enable setting, identify the setting.

3. Cycle key (SCOLL): used to change pages under the important parameter mode and all parameter mode; under the setting mode, the key is used to change pages and data; change the display mode.

According to the pressing time, there are 2 kinds of function:

B) Short time press (Sc) (the press time is shorter than 2 second)

Display mode (including important parameter display mode and all parameter display mode): change pages.

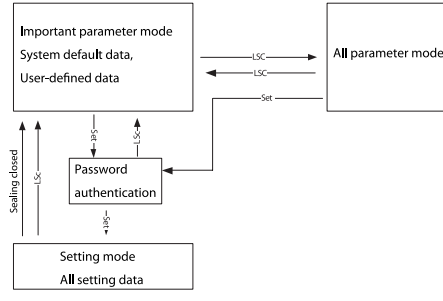
Setting mode: change pages and data.

C) Long time press (LSc) (the press time is longer than 2 second)

Display mode: change mode between important parameter display mode and all parameter display mode.

Setting mode: do not save the setting data and quit the setting mode then enter the important parameter display mode.

Mode change description:



Backlight description: there's any pressing action, the backlight would be lighten, after no action for 90s, the backlight off.

3.3 Parameter Display and Key Operations

Under the all parameter display mode, short time press the "SCOLL" key to display

different parameters. The change sequence is from the 1-29 screen(If the chosen specification doesn't support the function , just skip it). When it comes to the last screen, press the same key another time, back to the 1st screen.

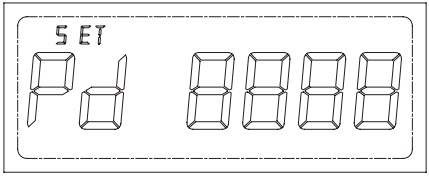
3.4 Settings and Operations

Under the setting mode, the meter could complete most of the data setting.

Under the no setting mode, short pressing the "Set" (brief as "Set" blow) enters the Password protection inquiry.

A) Password protectioninquiry

Password protectioninquiry is the key of key setting function. Only if input the correct password, you can enter the parameter setting page. If users input wrong password, it would quit the setting mode and enter the important parameter display mode. The factory default password is 0000



Enter thepass word key operation:

Short press "SCOLL" key (Sc): the number in the cursor position plus 1, when the number was 9, press the Sc would return to 0.

Short press "Set" key (Set): the cursor position move to right one, when the right-most position flashing, press the "Set" again, it would be passwordinquiry. Password correct: go to the meter address setting page. Password wrong: quit the setting mode and go to the

important parameter display mode.

B) Data setting

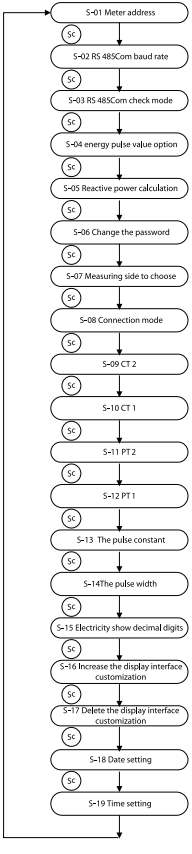
Operation description:

No cursor flashing: press the "Sc" key to change pages.

Cursor flashing: press the "Sc" key to change the number in the flashing position.

"Set" key could change the cursor flashing state, cursor's movement, confirm to the setting data. Illegal number could not be set and would keep the same data.

Different specifications support different setting data. Take AcuRev 1303 for example.



Address range 1-247

Chose from 1200, 2400, 4800, 9600, 19200, 38400bps

Chose from EVEN, ODD, NON1, NON2

P: Pulse output chooses active energy
Q: Pulse output chooses reactive energy

0: True reactive
1: The generalized reactive power

Change the password

0: The primary side
1: Secondary side

3LN 2LL
1LL 1LN

1, 5, 100, 200, 333

1-50000

50.0-400.0

50.0-999999.9

1-60000

20-100

0-3

Increase the display to cycle mode

Deleted from the circulation mode interface

Set current date

Set current time

Chapter 4 Functions and Software

This chapter will introduce you about how to use some important functions, many advanced function could not be operated through single key, which also need communication interaction, thus we made PC tools software. This chapter would introduce some functions with the help of these tools.

Different specification of AcuRev 1300 series meters support different parameters, you'll see the details in the function table. Take AcuRev 1304 for example.

4.1 Parameter settings

AcuRev 1300 series meters need basic settings so that the meters can work in the scheduled way. The figure below is the display of basic parameters that set by PC tools software.

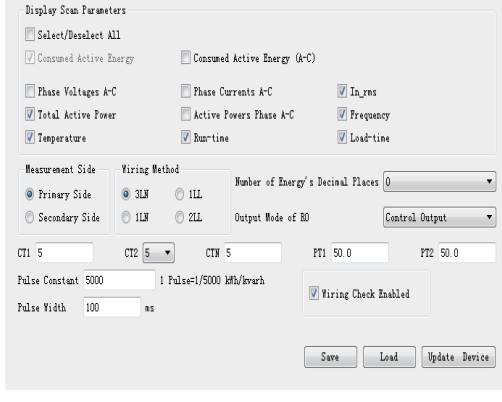


Figure 4-1 Basic setting parameters in the software

1) Reactive power calculate pattern

Real reactive: $Q = \sqrt{S^2 - P^2 - D^2}$

Generally reactive: $Q = \sqrt{S^2 - P^2}$

2) Energy pulse output

Used to choose the pulse type that represented by the pulse outputted through P1,P2 terminals.

Active: P1,P2 terminals output pulse is active power pulse.

Reactive: the output pulse is reactive power pulse.

3) Demand

Demand supports 4 kinds of calculate methods, which is Sliding block method, fixed block method, rolling block and thermal demand method.

a) Sliding block method: set a 1-30min window time, that is calculate time of demand. The window slid once per minute, so does the demand value. In this method, in the operation state demand calculation method is displayed to slip.

b) Fixed block method: set 1-30min as a demand calculate cycle. The whole cycle just calculate the demand once. Which means the demand update time is equal to the demand calculate cycle. In this method, in the operation state demand calculation method is displayed to block.

c) Rolling block method: set 1-30min as a demand calculate cycle and 1 slip time. Demand cycle must be integrated multiples of slip time. Calculate 1 cycle's demand at the end of the slip time. The demand update time is equal to the slip time. In this method, in the operation state demand calculation method is displayed to slip.

d) Thermal demand method: calculate the demand value through analog the theory

of the thermal demand table. Set 1-30min as a calculate cycle. In the whole cycle, we just need to calculate the demand once. Which means the demand update time is equal to the demand calculate cycle. In this method, in the operation state demand calculation method is displayed to block.

4) Sealing option

Choose the "meter clock + time of use", the corresponding content(meter clock, TOU parameters, Daylight saving time parameters) can be sealed.(the change of corresponding time must proceed when the seal is open.)

5) Communication permission

Divided into low permission and high permission.

Low permission: important operation (like clear demand event record, programming event record, open cover event record, meter data, energy data initial energy data) disabled. But it can update to high permission through updating the communication permission.

High permission: The communication supports all functions. 30 min after updating to the high permission, the meter would lower its permission to low permission automatically, to keep the meter's safety.

6) Display scan parameters

Users could add data to the display scan parameters through the PC tools software. The meter would cycling display the elected content.

7)Primary side/secondary side to choose

Electricity and electric parameter data for one side or the secondary side of data

8) Connection mode

According to the actual to select the correct connection mode, otherwise it will lead to the measurement data is not correct.

9) CT PT set

According to the practical use of set, otherwise, can lead to inaccurate measurement.

10)The pulse constant and pulse width

According to actual use the set, otherwise, can lead to inaccurate pulse output

11)Electricity decimal digits Settings

According to the set, electric energy according to different decimal digits, when change the Settings, may cause the error of electric energy metering.

12)RO output mode

RO output mode can be configured to remote control or alarm output, output can be configured according to the practical application.

4.2 Basic Measurement Functions

AcuRev 1300 mainly measure the Voltage, Current, Power, Frequency, Power Factor, demand. Demand supports power demand,current demand and demand prediction function.Among them, the center line current support calculated value and measured value of two kinds of algorithms, AcuRev1303 and below model using calculated value; AcuRev1304 and above model using measurement values, and support the calculation value of the residual current.

The figure below is the basic measurement parameter display.

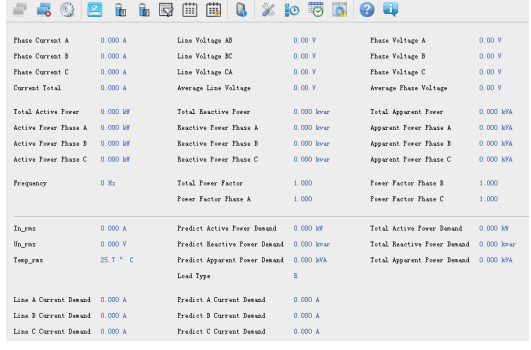
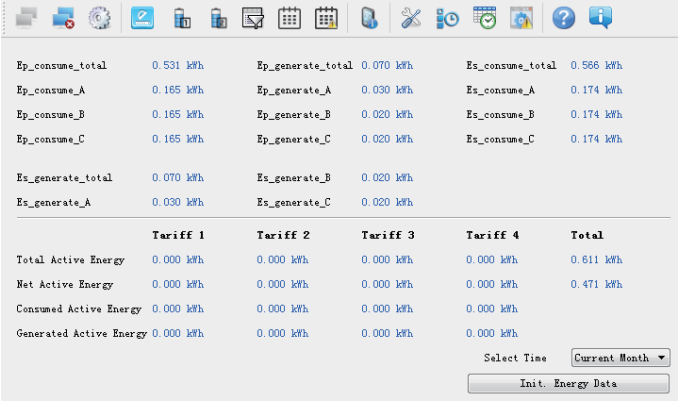


Figure 4-2 Basic Measurement Parameter Display

4.3Measurement function

AcuRev 1300 series instrument provide time-sharing two-way total electric energy metering system and split phase electricity.The departed time could be any day during the date 1-28. Real – time energy can change the energy base. Communication only can be changed under the high permission and sealing open condition. Support of electricity data

include:Consumed Active Energy,Generated Active Energy,Total Active Energy,Net Active Energy,Consumed Apparent Energy ,Generated Apparent Energy,Four-quadrant Reactive Energy,Consumed Reactive Energy,Generated Reactive Energy,Total Reactive Energy,Net Reactive Energy.



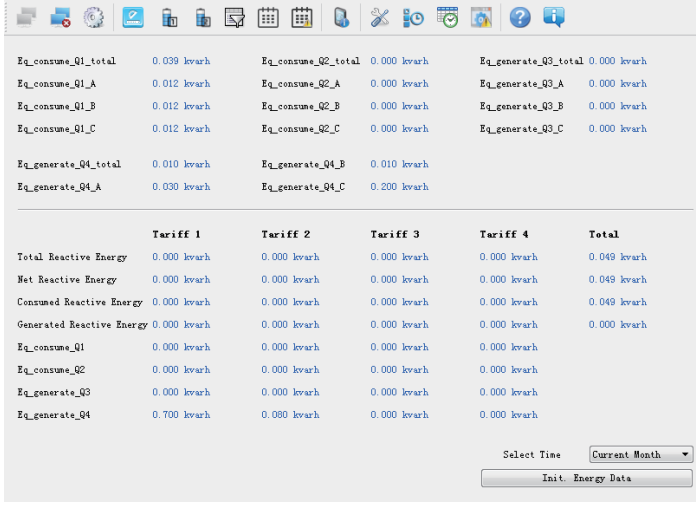


Figure 4-3 Calculation and Measurement Parameter Display

System power support time-sharing electricity function, split-phase power does not support this feature

According to the demand of users, we can depart the time to several sequence time segments. Each segment can point to the same or different rate (at most 4 kinds of rates). The meter decides to which rate the current time should belong to according to its inner clock or communication command. To achieve TOU calculate, it should be calculated separated in different rate.

TOU calculation can choose inner clock or communication command mode, which could make the application more flexible.

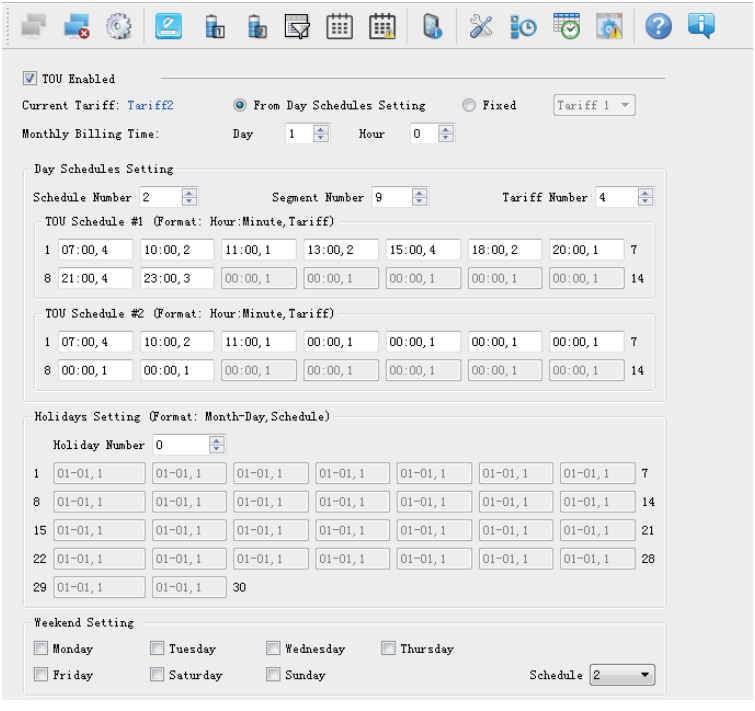


Figure 4-4 TOU Energy Setting Display

a) The currentrate ofvaluefrom theinternalclock

TOU energy time segment setting: at most 14 time blocks.Each block corresponds one segment table (at most 8 time segment tables). Each segment can point to anyone of the 4 rates.

User can use different time block, different time segment to fulfil personality demand. But to make sure the time is valid, the meter would examine the time setting strictly. If it is correct and has opened the TOU function, the meter would process the TOU calculate energy. If it is wrong and has opened the TOU function. The energy just cumulated to rate 1.

Time setting demands:

1. Number of time zone setting: after finishing the time zone number setting, the time zone would be divided according to the number of the time zone. Please attention that the time zone number should be integers from 1-14. And the time zone format should be open from small to large.

2. Time zone setting format: xx month-xx date, xx date time list. Only if the time zone be set according to the closed structure, it considered correct.

3. Date time segment meter's setting: The setting parameters of date time segment meter are interger from 1-14, after finishing the setting, the date time segment's parameters in the date time segment meter would be set in a increasing order according to the date time segment meter's setting.

4. Date time segment setting: the parameter should be integer from 1-14, after the setting finished, we can set the parameter in the date time segment table according to the set parameters.Only if the date time zone be set according to the closed structure, it considered correct.

5. Rate setting: the parameter should be integer from 1-4. It means the maximum that appeared in the TOU energy. After finishing the setting, it would be rate setting in the time

segment table. The rate parameter is one of 0,1,2,3(0:sharp; 1:peak; 2:valley; 3:even).

6. Holiday setting: the number of holiday is integer from 0-30, after finishing the setting, it would be holiday setting, which format is xx month-xx date.

Note: User can customarize the factory settings of time zone segment. When no asking, the meter would be set as the default factory settings. Users can recover the time zone segment setting value to the default value through communication.

The use of TOU energy holidays: in the TOU energy parameter setting part, firstly we should set the number of holidays, then set the demanded holiday in the holiday setting bar, the format is xx month- xx date. At this time, through setting the meter operate time, when the meter's operation time is in the setting time, the energy would increase under the corresponding rate.

Note: time-division energy is with the highest priority on holidays, when the set of special date is valid, the measurement of energy would consider the holidays at first.

Weekly restfunction

The use of TOU energy weekly rest: weekly rest(bit0- Sunday; bit1-bit6: Monday-Saturday . when bit is 1, it means weekday, when bit is 0 , it means weekend.) through setting the clock, when the meter's clock is under the weekly rest time segments, the energy would increase under the corresponding rate.

b)The value of the currentrate of self-communication order.

Daylight Saving Time function

Under the DST enable condition, if we choose fixed date option, it would change the DST according to the fixed date setting format. The format is month/date/hour/minute/ adjust time(unit:min). if we choose unfixed date option, it would change the DST according to the unfixed date setting format.The format is month/ week/which week/hour/minute/

adjust time(unit: min), according to the above setting format, it would change the DST automatically.

Through this function, we can achieve the meter's DST change automatically. When the clock operates to the DST start setting time, the meter could adjust the clock to some certain time segment in advance. But when the clock operate to the DST ending, the meter could adjust the time to some certain time segment pushed back.

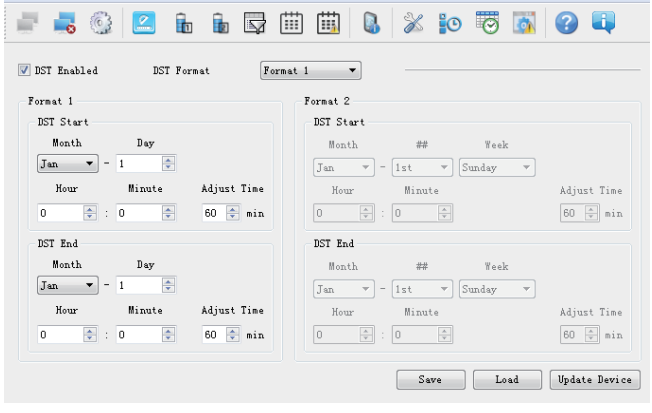
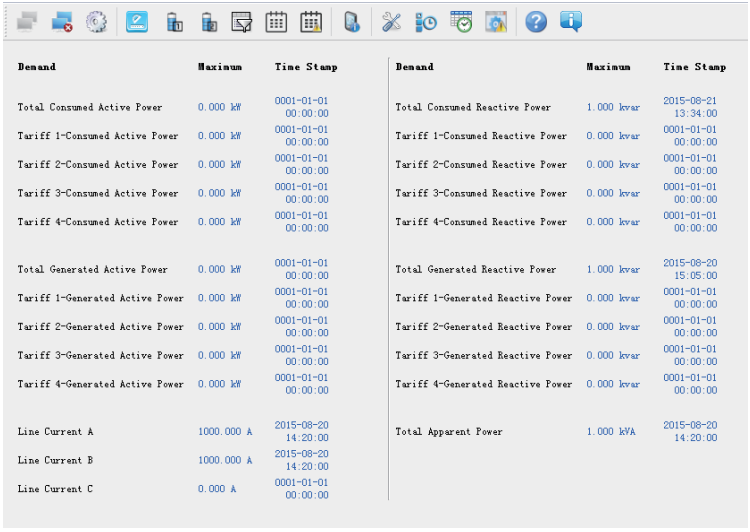


Figure 4-5 Daylight Saving Time Setting Display

4.4 Demand

Demand have four calculation methods: slipping block method, fixed block method, rolling block method, thermal demand method. Users can clear the demand.Support demand prediction, in each minute a demand forecast.Specific set set is introduced in the chapter 4.1.



Demand	Maximum	Time Stamp	Demand	Maximum	Time Stamp
Total Consumed Active Power	0.000 kW	0001-01-01 00:00:00	Total Consumed Reactive Power	1.000 kvar	2015-08-21 13:34:00
Tariff 1-Consumed Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 1-Consumed Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 2-Consumed Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 2-Consumed Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 3-Consumed Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 3-Consumed Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 4-Consumed Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 4-Consumed Reactive Power	0.000 kvar	0001-01-01 00:00:00
Total Generated Active Power	0.000 kW	0001-01-01 00:00:00	Total Generated Reactive Power	1.000 kvar	2015-08-20 15:05:00
Tariff 1-Generated Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 1-Generated Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 2-Generated Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 2-Generated Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 3-Generated Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 3-Generated Reactive Power	0.000 kvar	0001-01-01 00:00:00
Tariff 4-Generated Active Power	0.000 kW	0001-01-01 00:00:00	Tariff 4-Generated Reactive Power	0.000 kvar	0001-01-01 00:00:00
Line Current A	1000.000 A	2015-08-20 14:20:00	Total Apparent Power	1.000 kVA	2015-08-20 14:20:00
Line Current B	1000.000 A	2015-08-20 14:20:00			
Line Current C	0.000 A	0001-01-01 00:00:00			

Figure 4-6 Demand Parameter Display

4.5 RO function

AcuRev1300 have relay output (RO), all the way to realize the remote control or alarm output.

4.6 Event Logging

The meter supports the event logging of important operation. Including programmingevent, open meter cover event, demand clearevent, event clearance event, meter clearance event.

Programming event: record the programming time and programming event flag when programming some important parameters of the meter. When one programming event occur several times within 5 min, the meter just record the first time.

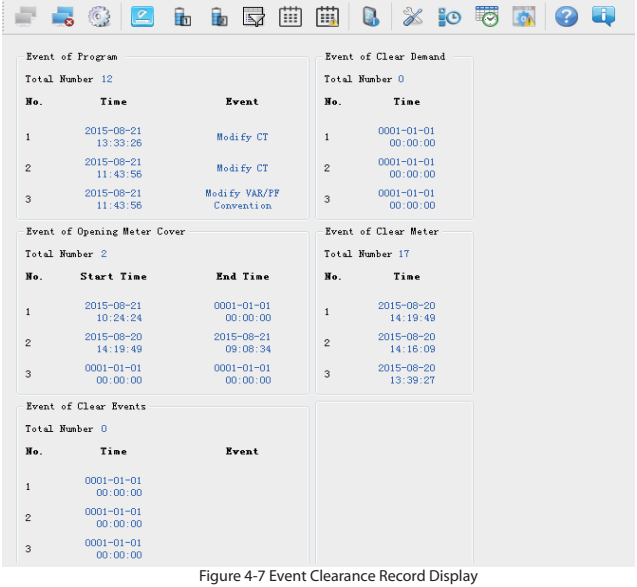
Programming flag	Programming event
01	Meter address programming event
02	RS485 communication programming event
03	Reserved
04	Reserved
05	Energy pulse programming event
06	Demand related programming event
07	Reactive calculate method programming event
08	VAR/PF statute programming event
09	Change time programming event
100	Change energy base programming event
101	TOU parameter programming event
102	Daylight saving time programming event
103	Trend record programming event

Open meter cover event: record the open and close event, support 3 groups of open meter cover event.

Demand clearance event: clear the demand record, support 3 groups of demand clearance event.

Event clearance event: clear the event record, support clear demand clearance event, open meter cover event, programming event, support 3 groups of open meter cover event. Support 3 groups of event clearance event.

Meter clearance event: clear parameter record, this event cannot be cleared. Support 3 groups of meter clearance event.



Event of Program

Total Number 12

No.	Time	Event
1	2015-08-21 13:33:26	Modify CT
2	2015-08-21 11:43:56	Modify CT
3	2015-08-21 11:43:56	Modify VAR/PF Convention

Event of Clear Demand

Total Number 0

No.	Time
1	0001-01-01 00:00:00
2	0001-01-01 00:00:00
3	0001-01-01 00:00:00

Event of Opening Meter Cover

Total Number 2

No.	Start Time	End Time
1	2015-08-21 10:24:24	0001-01-01 00:00:00
2	2015-08-20 14:19:49	2015-08-21 09:08:34
3	0001-01-01 00:00:00	0001-01-01 00:00:00

Event of Clear Meter

Total Number 17

No.	Time
1	2015-08-20 14:19:49
2	2015-08-20 14:16:09
3	2015-08-20 13:39:27

Event of Clear Events

Total Number 0

No.	Time	Event
1	0001-01-01 00:00:00	
2	0001-01-01 00:00:00	
3	0001-01-01 00:00:00	

Figure 4-7 Event Clearance Record Display

4.7 Alarm function

AcuRev1300 series instrument event alarm function, which is of the definition of when a parameter changes make events inequality (or) equation was established, and the duration exceeds the preset time limit, the event alarm will be started at this moment, when the alarm parameters of serial number, number, alarm status and alarm occurs as the event was a record store at all times, there can be a maximum of 20 article such records stored in the event log buffer.And can be set as the limit of the RO as alarm output event alarm signal output.Use the event before the alarm function seriously to complete a number of Settings (conditions of inequality (or equations), can make the switch, etc.), any incomplete or inaccurate setting will lead to the failure of the final output.Set up operations are conducted based on the corresponding register set to complete.Need of special note is: these register setting must be set by communication, and alarm value are the secondary side of the measured values.Tool software setting the alarm display as shown in figure 4 - 8

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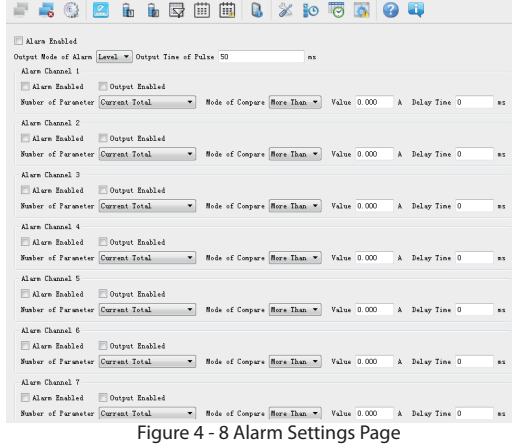


Figure 4 - 8 Alarm Settings Page

1.Single event alarm Settings

Table 4 -1 lists the content and address, and the parameters of the first set of set records recorded a total of 12 groups of such Settings, the format is the same.

The Modbus address	Parametric description	Data type	Read and write attribute	Numerical range	Register number
705	Parameter number	word	R/W	0 ~ 28 (see attachment)	1
706	Compare the way	word	R/W	Is greater than 0; Is equal to 1; Less than 2	1
707	The set value	word	R/W		1
708	Delay time	word	R/W	0~3000(×10ms)	1

Table 4-1 First set alarm parameters setting

Alarm parameter number: select the group related parameters, such as 12 - frequency (refer to chapter 5 in the "serial number corresponding alarm parameters table"), alarm, the group will judge conditions for this parameter.Comparative way, value: build alarm conditions, such as greater than, equal to, less than set value.If set frequency, is greater than, 50, alarm condition for more than 50 hz frequency.Note: the "set point" is corresponding with the principal part of parameters, it communication value and actual value of the conversion relations in the following table.

Parameter number	Communication value of the set value and the actual value of multiple relationship
0~3	1000
4~11	10
12	100
13~24	1
25~28	1000

Delay time: how long will the alarm conditions keep after that event is established.The setting range of 0 ~ 30000, the per unit time is 1 ms, set to zero without delay, immediately trigger the alarm events.1/10 of the communication value of the actual value.

Output to the relay: set to 0, alarm occurs, the group is not output from RO.If set to 1, assuming the M11 module is connected, and M11 RO work mode setting of alarm mode in the module, alarm occurs, the group output to the RO1, namely RO1 closed, until all the output to the RO1 alarm RO1 to disconnect after recovery.RO2 ~ RO8 and RO1 principle is the same.Note: when the relay is used for alarm output only "level" output mode, there is no "pulse" output mode, the relay output Settings (pulse or level) will be ignored.After completion of a single event of the functions of setting, the need for the following global, alarm function can be normal use.

2. The alarm global Settings

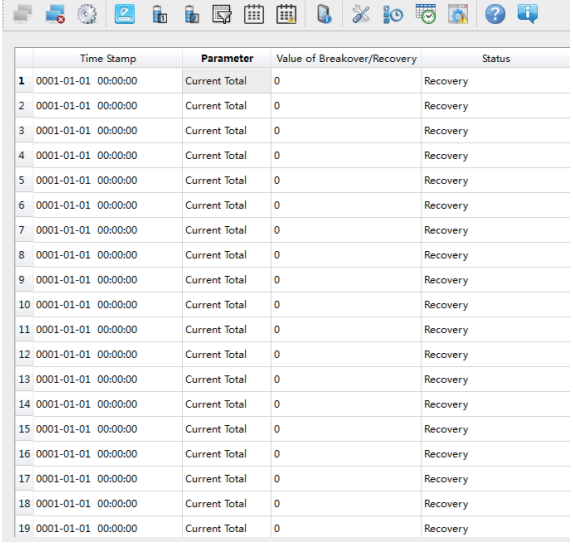
The communication address table 700 h to 704 h address global parameters for alarm correlation.Alarm switch: always determines whether this instrument enable event alarm function, and is set to "1", to enable the alarm function, related to the alarm Settings to take effect.

Each alarm channel stop switch: to determine whether the alarm set in each group.As a 16-bit unsigned integer, the bit0 ~ bit11 respectively corresponding to the group 1 to 12 group can set the alarm, the corresponding bit is "1" when the group alarm set to take effect, otherwise is invalid.

When the alarm events, can be configured RO work mode, make it as an alarm output. AcuRev1300 support 2 alarm output modes, pulse output mode and the level of output, respectively, when choosing pulse output mode, you can set the corresponding pulse width, the range of 50 ~ 3000 ms.And need to configure the various alarm output channel can make logo, the bit0 ~ bit11 respectively corresponding to the group 1 to 12 groups can make alarm output, the corresponding bit is "1", the group of alarm events, RO accordingly output, otherwise is invalid.

3. Alarm record

Available for event alarm record store data buffer can store 20 groups of alarm events, not guarantee a set a record, but with the method of circulation records, the events of the new record will cover the earliest records.When the limit of alarm parameter back to normal, normal value and events also referred to as the event log, user access to the limit of time and return to normal time, you can get the limit the duration of the event.



	Time Stamp	Parameter	Value of Breakover/Recovery	Status
1	0001-01-01 00:00:00	Current Total	0	Recovery
2	0001-01-01 00:00:00	Current Total	0	Recovery
3	0001-01-01 00:00:00	Current Total	0	Recovery
4	0001-01-01 00:00:00	Current Total	0	Recovery
5	0001-01-01 00:00:00	Current Total	0	Recovery
6	0001-01-01 00:00:00	Current Total	0	Recovery
7	0001-01-01 00:00:00	Current Total	0	Recovery
8	0001-01-01 00:00:00	Current Total	0	Recovery
9	0001-01-01 00:00:00	Current Total	0	Recovery
10	0001-01-01 00:00:00	Current Total	0	Recovery
11	0001-01-01 00:00:00	Current Total	0	Recovery
12	0001-01-01 00:00:00	Current Total	0	Recovery
13	0001-01-01 00:00:00	Current Total	0	Recovery
14	0001-01-01 00:00:00	Current Total	0	Recovery
15	0001-01-01 00:00:00	Current Total	0	Recovery
16	0001-01-01 00:00:00	Current Total	0	Recovery
17	0001-01-01 00:00:00	Current Total	0	Recovery
18	0001-01-01 00:00:00	Current Total	0	Recovery
19	0001-01-01 00:00:00	Current Total	0	Recovery

Figure 4-9 Alarm record page

4.8 Incorrect connection detection

AcuRev1300 series instrument has the function of connection detection, Can be set in the interface to the function that can, in the case of function can make can automatically detect instrument according to the instrument connection mode of connection is correct,its principle is as follows:

1. Lack of phase detection: a phase voltage value is 0, as lack of phase.

2. Voltage phase sequence detection: A phase voltage as the reference point, determine the voltage phase sequence, such as detected by reverse phase sequence, or could be N lines to meet the current and voltage and voltage is the voltage and the indirect inverse. To determine the voltage value, such as a two phase voltage values are with another phase voltage deviation is too large (0.3 times), was convicted for the phase voltage into the N wrong; Otherwise the sentence to indirect fault voltage, B, C phase fault.

3. Current detection: A phase voltage as the reference point, read the phase current and voltage between A phase Angle, to judge whether its value and standard value Φ Angle deviation within 30 °, if meet the requirements, convicted for the current connection correct; Between Φ +180° ±30°, jailed for current reverse; Other values for the current phase sequence error.

Visible, the calibration method is suitable for the situation that voltage current Angle should not exceed 30 ° (Each phase PF value should be greater than 0.866), and is based on A phase voltage reference direction, therefore should ensure that A phase voltage connection correct; As A phase voltage phase or connect with N, the current test results do not have reference meaning; Like the other two phase with A fault, the test result is correct, but may lead to inconsistent with system parameters.Such as the meter voltage wiring in order for B, C, A, wiring in the system in order for A, B, C, will cause A phase data does not match, need to pay attention to.

The address table 100 h can read wiring test results:

Connection test results:

Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserve	Phase Voltage A Missing	Phase Voltage B Missing	Phase Voltage C Missing	Reserve	Phase Voltage A wrong Connecting	Phase Voltage B wrong Connecting	Phase Voltage C wrong Connecting
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserve	Phase Current A Wrong Direction	Phase Current B Wrong Direction	Phase Current C Wrong Direction	Reserve	Phase Current A Wrong Connecting	Phase Current B Wrong Connecting	Phase Current C Wrong Connecting

Can also through the LCD to display test results:

The first screen in the entire information mode voltage test results, the format for "UXXXXXX",Where X represents the number "1" or "0", "0", said the incident was not happened ; "1", said the incident was happened.

From left to right 1 ~ 3 digits said Phase Voltage A Missing, Phase Voltage B Missing , Phase Voltage C Missing, 4 ~ 6 said Phase Voltage A wrong Connecting, Phase Voltage B wrong Connecting,Phase Voltage C wrong Connecting.

The second screen in the entire information mode voltage test results, the format for "IXXXXXX",Where X represents the number "1" or "0", "0", said the incident was not happened; "1", said the incident was happened.

From left to right 1 ~ 3 digits said Phase Current A Wrong Direction,Phase Current B Wrong Direction,Phase Current C Wrong Direction ,4 ~ 6 said Phase Current A Wrong Connecting,Phase Current B Wrong Connecting,Phase Current C Wrong Connecting.

4.9 Meter Information

Available meter type, hardware version, software version, release date, serial number and other basic informationas well as real-time clock ,load, connection test results and seal condition, etc through the meter's information interface

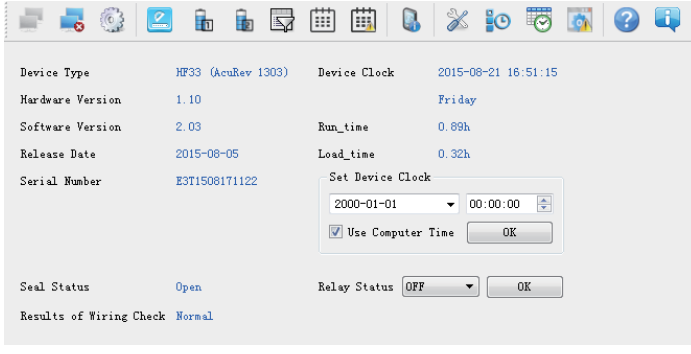


Figure 4-10 Meter Information Display

4.10 Sealing function

AcuRev1300 series meters support sealing function. When the sealing is open, the read& write operation is not limited.When the sealing is closed, the read operation is not limited.Sealing function is not allowed write operation, including communication and key change.

From 209H, we could know the user's content that needed to be shield when the sealing is closed. When the sealing is closed, the user-defined nonstandard contend is valid.

From 101H, we can see if the sealing state is valid. When the sealing key is invalid, the address displays open sealing state. When the sealing is valid, the address displays closed sealing state, and the corresponding content would be shield.

209H	Sealing optional content	Bit0: TOU setting sealing or not Other bits are reserved 1:enable 0:disable

Note: The contents of the following table to play "√" address, communications, key exception write operation will return an error code 02H. And you can not change the corresponding content.

Seal standard content:

Address	Parameter description	Communication	Key
203H	Pulse quantity choice	√	√
204H	Demand calculation	√	-
205H	Demand calculation cycle	√	-
206H	Slip the time demand calculation	√	-
207H	Reactive power calculation method	√	√
208H	VAR/PFstatute	√	-
209H	Seal the optional content	√	-
213H	Remove electric meter data (except the data on removal of demand)	√	-
216H	Measuring side to choose	√	√
217H	Connection mode	√	√
218H	CT2	√	√
219H	CT1	√	√
220H	CTN	√	-
221H	PT2	√	√
222H~223H	PT1	√	√

224H	The pulse constant	√	√
225H	The pulse width	√	√
226H	Electricity show decimal digits	√	√

Energy :

Modbus address (HEX)	Parameter description	Communication	Key
900H-901H	Total Active Energy	√	--
902H-903H	Total Active Energy tariff 1	√	--
904H-905H	Total Active Energy tariff 2	√	--
906H-907H	Total Active Energy tariff 3	√	--
908H-909H	Total Active Energy tariff 4	√	--
90AH-90BH	Net Active Energy	√	--
90CH-90DH	Net Active Energy tariff 1	√	--
90EH-90FH	Net Active Energy tariff 2	√	--
910H-911H	Net Active Energy tariff 3	√	--
912H-913H	Net Active Energy tariff 4	√	--
914H-915H	Import Active Energy	√	--
916H-917H	Import Active Energy tariff 1	√	--
918H-919H	Import Active Energy tariff 2	√	--
91AH-91BH	Import Active Energy tariff 3	√	--
91CH-91DH	Import Active Energy tariff 4	√	--
91EH-91FH	Export Active Energy	√	--
920H-921H	Export Active Energy tariff 1	√	--
922H-923H	Export Active Energy tariff 2	√	--
924H-925H	Export Active Energy tariff 3	√	--
926H-927H	Export Active Energy tariff 4	√	--
928H-929H	Total Reactive Energy	√	--
92AH-92BH	Total Reactive Energy tariff 1	√	--
92CH-92DH	Total Reactive Energy tariff 2	√	--
92EH-92FH	Total Reactive Energy tariff 3	√	--
930H-931H	Total Reactive Energy tariff 4	√	--
932H-933H	Net Reactive Energy	√	--

934H-935H	Net Reactive Energy tariff 1	√	--
936H-937H	Net Reactive Energy tariff 2	√	--
938H-939H	Net Reactive Energy tariff 3	√	--
93AH-93BH	Net Reactive Energy tariff 4	√	--
93CH-93DH	Import Reactive Energy	√	--
93EH-93FH	Import Reactive Energy tariff 1	√	--
940H-941H	Import Reactive Energy tariff 2	√	--
942H-943H	Import Reactive Energy tariff 3	√	--
944H-945H	Import Reactive Energy tariff 4	√	--
946H-947H	Export Reactive Energy	√	--
948H-949H	Export Reactive Energy tariff 1	√	--
94AH-94BH	Export Reactive Energy tariff 2	√	--
94CH-94DH	Export Reactive Energy tariff 3	√	--
94EH-94FH	Export Reactive Energy tariff 4	√	--
950H-951H	Apparent Energy	√	--

Sealing nonstandard content test

1) When the TOU related is valid, the TOU related content need to be shield:

Address	Parameter	Communication	Key
300H	clock: year	√	√
301H	clock: month	√	√
302H	clock: date	√	√
303H	clock: hour	√	√
304H	clock: minute	√	√
305H	clock: second	√	√
306H	clock: week	√	√

Note: When the sealing is closed, it could be changed when the meter's change time and current operation time is within 5 minutes.

Address	Parametric description	Communication	Key
TOU related parameters			
402H-40EH	Time-division energy setting parameter 1	√	--
420H-5F3H	Time-division energy setting parameter 2	√	--
Daylight Saving Time related parameters			
350H-367H	Daylight Saving Time related parameters	√	--

Chapter 5 Communication

This chapter introduced how to use software to manipulate the meter through the communication interface.This chapter content master needs you with MODBUS protocol knowledge reserves and read through the content of all the other chapters in this manual, this product features and applications concept has a more comprehensive understanding.

The chapter's contents include MODBUS protocol, communication format, application details of AcuRev 1300 series meter.

5.1 Modbus Protocol Introduction

1. Transmission mode

The mode of transmission defines the data structure within a frame and the rules used to transmit data.

- Coding System 8 bit
- Start bit 1 bit
- Data bits 8 bit
- Parity No parity / odd parity / even parity
- Stop bit 1bit or 2bit
- Error checking CRC

2. Frame

When data frame reaches the terminal unit, it goes through the unit via a special "port", theunit removes the data frame's header, reads the data, if there is no error, then it implements the data's task. Afterwards, the unit puts its own data with the acquired header, and sends back the frame to the sender. The response data frame contains: Address, Function, Data and CRC Check. Any error will cause a failure to respond.

2.1 Frame Format

Address	Function	Data	Check
8-Bits	8-Bits	N x 8-Bits	16-Bits

Table 5-1 Data Frame Format

2.2 Address Field

The address field is at the start of the frame. It is composed of 1 byte (8 bits), its decimalvalue range is 0-247.

A master addresses a slave by placing the slave address in the address field of the

message. When the slave sends its response, it places its own address in this address fieldof the response to let the master know which slave is responding.

2.3 Function Field

When a message is sent from a master to a slave device the function code field tells theslave what kind of action to perform.

Code	Meaning	Action
03	Read data register	Obtain current binary of 1 or more register
16	Preset register	Set binary value to 1 or more register
01	Reading relay RO status	Get the current state of the relay of the RO output (ON/OFF)
05	Control relay RO state	Control relay RO output state (ON/OFF)

Table 5-2 Function Code

2.4 Data Field

Data field contains the data that terminals need to complete the request and the

data that terminals respond to the request. This data may be a numerical value, address or setting. For example, Function Code tells the terminal to read one register, Data Field needs to specify reading from which register and how many registers to read.

2.5 Error Check Field

The field allows the error check by master and slave devices. Due to electrical noise andother interferences, a group of data may be changed while transmitting from one location to the other. Error Check ensures master or slave devices do not respond to the distorted data during the transmission, which enhances the system security and efficiency. Error Check uses 16-bit Cyclic Redundancy Check (CRC 16).

3. CRC Check

Every message includes an error checking field which is based on the Cyclical Redundancy Check (CRC) method. The CRC field checks the contents of the entire message. It isapplied regardless of any parity check method used for the individual characters of the message. The CRC field is two bytes long, containing a 16-bit binary value. The CRC valueis calculated by the transmitting device, and is appended to the message.

The receiving device recalculates the CRC value during reception of the message, and compares the calculated value to the actual value it received in the CRC field.

An error will be reported if the two values are not equal. CRC calculation is first started by preloading the whole 16-bit register to 1's. The process begins by applying successive 8-bitbytes of the message to the current contents of the register. Only the eight bits of data ineach character are used for generating the CRC. Start and stop bits, and the parity bit, donot apply to the CRC.

When generating the CRC, each 8-bit character is exclusive ORed with the register 117contents. The result is shifted towards the least signifcant bit (LSB), with a zero filled

intothe most signifcant bit (MSB) position. The LSB is extracted and examined, if the LSB equals to 1, the register is exclusive ORed with a preset, fixed value; if the LSB equals to 0, noaction will be taken. This process is repeated until eight shifts have been performed. Afterthe last (eighth) shift, the next 8-bit byte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. The final contents of the register, after all the bytes of the message have been applied, is the CRC value. Whenthe CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

5.2 Communication Format

This section is for instance will be as far as possible use as shown in table 5-3 format, (as hexadecimal Numbers).Table 5-3 Protocol Illustration

Addr	Fun	Data start reg hi	Data start reg lo	Data #of regs hi	Data #of regs lo	CRC16 Hi	CRC16 Lo
06H	03H	00H	00H	00H	21H	84H	65H

Addr: Slave device address

Fun: Function Code

Data start reg hi: Start register address, high byte

Data start reg lo: Start register address, low byte

Data #of reg hi: Number of registers, high byte

Data #of reg lo: Number of registers, low byte

CRC16 Hi: CRC high byte

CRC16 Lo: CRC low byte

1. Read Data (Function Code 03H)

Query:

This function allows users to obtain the device received and recorded data and system data.

Table 5-4 depicts reading 3 meters' received basic data, total active energy, total active energy tariff1,total active energy tariff2 from 17th slave device. The data type of energy is dward. Each parameter takes 2 bits, and each bit takes 2 bytes. AcuRev 1300 series meters' total active energy address are 900H, 901H. Total Active Energy tariff 1 address is 902H, 903H. Total Active Energy tariff 2 address is 904H, 905H.

Table 5-4 Query Frame of Reading Energy

Addr	Fun	Data start addr HI	Data start addr LO	Data #of regs HI	Data #of regs LO	CRC16 HI	CRC16 LO
11H	03H	09H	00H	00H	06H	C4H	C4H

Response

The slave device anwsers the master device's query. The response frame contains slavedevice address, function code, data quantity and CRC check.

Table 5-5 is an example response of reading Total Active Energy (1.27kwh), Total Active Energy tariff 2 (1.00kwh), Total Active Energy tariff 2 (0.27kwh). (when the energy data is transmitting, real value= communication value/100).

Table 5-5 Response of Total Active Energy,Total Active Energy tariff 1,Total Active Energy tariff 2

Addr	Fun	Byte count	Data1 HI	Data1 LO	Data 2 HI	Data2 LO	Data3 HI	Data3 LO	Data4 HI	Data4 LO
11H	03H	0CH	00H	00H	00H	7FH	00H	00H	00H	64H

Data5 hi	Data5 Lo	Data 6 hi	Data6 lo	CRC16 hi	CRC16 lo
00H	00H	00H	1BH	96H	8DH

2. Preset/Reset Multi-Register (Function Code 10H)

Set:

Function code 10H allows users to change multiple registers' content, including system parameter, time-division energy parameter, initialization energy.

Table 5-6 is an example of It's Total Active Energy is 0.20KWh,Total Active Energy tariff 1 is 0.12KWh,Total Active Energy tariff 2 is 0.08KWh 17th slave device.

Table 5-6 Preset Energy Data

Addr	Fun	Data start reg HI	Data start reg LO	Data #of reg HI	Data #of reg LO	Byte Count
11H	10H	09H	00H	00H	02H	04H

Value HI	Value LO	Value HI	Value LO	CRC HI	CRC LO
00H	00H	00H	14H	CDH	30H

3.Read the relay output state (functional code 01 h)

Query data frames:

Query data frame, the host to send data from the machine frame.01 function allows the user to obtain the specified address from the machine5.2 the Modbus protocol communication application format explanation of relay output state ON/OFF (1 = ON, 0 = OFF), in addition to from the machine address and functional domains, still need to be in the data field contains a data frame will be read by the initial address and number of relay to read.

Table 5-7 Reading Relay Output State of Querying Data Frames

Addr	Fun	Data start reg HI	Data start reg LO	Data #of reg HI	Data #of reg LO	CRC16 HI	CRC16 LO
11H	01H	00H	00H	00H	02H	BFH	5BH

The response data frames:

Response data frames, respond to the host data from the machine frame. Include address, function code, the amount of data from the machine and CRC error checking, and packet in each relay occupy a (1 = ON, 0 = OFF), the first byte of the lowest for addressing to relay value, the rest in the back.As shown in table 5-5 for instance relay output state response.

Addr	Fun	Byte count	Data	CRC16 HI	CRC16 LO
11H	01H	01H	02H	D4H	89H

The Data byte content

Table 5-8 Read the State of theRelay Response Data

7	6	5	4	3	2	1	0
0	0	0	0	0	0	1	0

MSB (Relay 1 = OFF , Relay 2=ON) LSB

3.Control relay output (functional code 5 h)

Query data frames:

The data frame to set up an independent relay is ON or OFF.Data FF00H will check relay for state, while 0000 h will set the relay for the OFF state; All other values are ignored, and shall not affect the relay state.

The following example is a request from machine set the relay 1 to 17 ON state.

Table 5-9 Independent Control Relay Query

Addr	Fun	DO addr HI	DO addr LO	Value HI	Value LO	CRC16 HI	CRC16 LO
11H	05H	00H	00H	FFH	00H	8EH	AAH

The response data frames:

Is a normal response to this command request after the relay state changes back to receive data.

Table 5-10 Independent Relay Control Response Response

Addr	Fun	DO addr HI	DO addr LO	Value HI	Value LO	CRC16 HI	CRC16 LO
11H	05H	00H	00H	FFH	00H	8EH	AAH

5.3 Application Details

1. Data Type

"Bit"is binary value;

"Word" is 16-bit unsigned integer, using one register address, 2 bytes. The data range is0-65535.

"int16"is 16-bit signed integer, using one register address, 2 bytes. The data range is -32768-32767.

"dword"is 32-bit unsigned integer, using two register addresses, high bytes followed by low bytes, using 4 bytes in total. The data range is 0-4294967295;

"int32"is 32-bit signed integer, using two register addresses, 2 bytes. The data range is -32768-32767.

"float"is single precision floating point, using two register addresses.The data

range is -2147483648~2147483647.

2. The relationship between communication value and real value

The meter's communication value does not always equal the real value. There is a

conversion relationship between them. It is very important to be aware of the parameterrelationship when users design a communication software, otherwise the result may beincorrect.

Table 5-11 The relationship between communication value and real value

Parameter	Relationship	Unit
System Parameter, Status, Parameter	The communication value equals the real value	No Unit
Real-time Clock, Timestamp	The communication value equals the real value	No Unit
Electrical measurement parameters	Used with the scaling factor f of the measurement parameters	Electrical measurement parameters' unit
PT1, PT2	The actual value is equal to the communication / 10	No Unit
Meter run time	The actual value is equal to the communication / 100	Unit: hours
Load running time	The actual value is equal to the communication / 100	Unit: hours

3. Parameter address table

Model 1,2,3,4means AcuRev1301, AcuRev1302, AcuRev1303, AcuRev1304.

Read only block

03H- read command.

Table 5-12 Meter Running State Display

MODBUS address		Parameter description	Data type	Access Property	Range	Default	Model	Register number
HEX	Decimal							
100H	256	The Result of Wiring Check	word	R	Refer to Appendix "The Result of Wiring Check"		1, 2 3, 4	1
101H	257	Seals status	word	R	0x0A: Seal sealed Others: Seal opened		1, 2 3, 4	1

System parameter district

System parameter decides the device's working mode.

10H- read command

03H- write command

Table 5-13 System Parameters address table

MODBUS address		Parameter description	Data type	Access Property	Range	Default value	Model	Register number
HEX	Decimal							
200H	512	Meter Address	word	R/W	1-247	1	1~4	1
201H	513	RS485 Baud Rate	word	R/W	1200; 2400; 4800; 9600; 19200; 38400	19200	2~4	
202H	514	RS485 Parity Bit Setting	word	R/W	0: Even parity; 1: Odd parity 2: No parity, Stop Bit 2 3: No parity, Stop Bit 1	3	2~4	1
203H	515	Impulse Choice	word	R/W	0: Active Power 1: Reactive Power	0	2~4	1
204H	516	Demand Calculation Method	word	R/W	0: Sliding Window; 1: Fixed Window; 2: Rolling Window 3: Thermal	0	2~4	1
205H	517	Demand Calculation Period	word	R/W	1-30 minutes	15	2~4	1
206H	518	Demand Calculation Slipping Time	word	R/W	1-30minutes	1	2~4	1
207H	519	Reactive Power Calculation Method	word	R/W	0: True (sinusoidal); 1: Generalized (harmonics present)	0	2~4	1
208H	520	VAR/PF Convention	word	R/W	0:IEC; 1:IEEE	0	2~4	1

209H	521	Sealed Parameters Selection	word	R/W	Bit0:TOUSet is Sealed or Not Bit1-Bit5: 0 1: valid of corresponding Selection; 0: invalid of corresponding selection	0	2~4	1
20AH	522	Communication Revise Operation Authority	word	R/W	0x02: Meter Reset, Event Reset, write Energy Data 0x04: write Data(except Energy Data), Demand Peak reset Note: Register Revise needs correct Password, incorrect password is invalid.	0	2~4	1
20BH	523	Password	word	W	0000-9999 Used for revise Communication Operation Authority, verify password when get new password		2~4	1
20CH	524	New Password	word	W	0000-9999 Note: To get new password needs correct current password, incorrect current password is invalid.		2~4	1

20DH	525	Meter Data Reset	word	W	Bit0: Reset Demand Record; Bit1: Reset Event Record; Bit2: Reset System Event Record; Bit3: Reset Meter Opening Record; Bit4: Reset Demand Event; Bit5: Reset Alarm Event; Bit6: Reset Meter Operation Time; Bit 7: Reset Time of Meter Operation with Load Bit8: Reset Meter Record (Reset energy record, demand peak and happening time record, system event record, etc) 0: Reset 1: NO Note: reset no valid without Communication Revise Operation Authority		2~4	1
20EH	526	Optional Display Symbol 1			Please see Appendix "Optional Display Symbol Setting "		1~4	1
20FH	527	Optional Display Symbol 2					1~4	1
210H	528	Parameter Measurement side	word	R/W	0: primary side; 1:Secondary side	0	1~4	1
211H	529	Wiring Mode	word	R/W	0:3LN 1:2LL 2:1LL 3:1LN	0	1~4	1

212H	530	CT2 Value	word	R/W	1; 5; 100; 200; 333	According to the order	1~4	1
213H	531	CT1 Value	word	R/W	1~50000/5~50000	5	1~4	1
214H	532	CTN Value	word	R/W	1~50000/5~50000	5	4	1
215H	533	PT2 Value	word	R/W	50.0~400.0 (Communication value is 10 times of the real value)	220.0	1~4	1
216H-217H	534-535	PT1 Value	word	R/W	50.0~999999.9 (Communication value is 10 times of the real value)	220.0	1~4	2
218H	536	Energy Pulse Constant	word	R/W	1-60000	5000	1~4	1
219H	537	Energy Pulse Width	word	R/W	20-100 ms	80	1~4	1
21AH	538	Energy display Decimal	word	R/W	0,1, 2, 3	1	1~4	1
21BH	539	Relay Operating Mode	word	R/W	0: Relay Control 1: Alarm Output	0	2~4	1
21CH	540	connection detection enable	word	R/W	0:No enable 1:Enable	1	1~4	1

Table 5-14 display programming table

Page	No.	Setting flag	Content	Model 1	Model 2	Model 3	Model 4
1			Voltage wiring detection	√	√	√	√
2			Current connection detection	√	√	√	√
3			Instrument address	√	√	√	√
4			RS485 communication baud rate		√	√	√

5			RS485 communication way of checking		√	√	√
6			Hardware version	√	√	√	√
7			Software version	√	√	√	√
8			The release date	√	√	√	√
9			specifications	√	√	√	√
10			The input active power	√	√	√	√
11-13	1	optional display flag word1 - Bit0	The input active power (A - C)	√	√	√	√
14-16	8	optional display flag word1 - Bit7	The voltage (A - C)	√	√	√	√
17-19	9	optional display flag word1 - Bit8	Current phase (A - C)	√	√	√	√
20	10	optional display flag word1 - Bit9	Line current	√	√	√	√
21	11	optional display flag word1 - Bit10	The system active power	√	√	√	√
22-24	12	optional display flag word1 - Bit11	Shunt active power	√	√	√	√
25	16	optional display flag word1 - Bit15	frequency	√	√	√	√
26	17	optional display flag word2 - Bit0	The temperature	√	√	√	√
27	20	optional display flag word2 - Bit3	Meter run time	√	√	√	√
28	21	optional display flag word2 - Bit4	Load running time	√	√	√	√
29			end				

Clock (03H: read 10H: write)

Table 5-15 Clock Address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
300H	768	clock: year	word	R/W	2000-2099	2000	2~4	1

301H	769	clock: month	word	R/W	1-12	1	2~4	1
302H	770	clock: date	word	R/W	1-31	1	2~4	1
303H	771	clock: hour	word	R/W	0-23	0	2~4	1
304H	772	clock: minute	word	R/W	0-59	0	2~4	1
305H	773	clock: second	word	R/W	0-59	0	2~4	1
306H	774	Week	word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	6	2~4	1
310H-311H	784-785	Run_tim	Uint32		0-999999999 (Communication value is 100 times o0f the real value)		1~4	2
312H-313H	786-787	Load_tim	Uint32		0-999999999 (Communication value is 100 times of the real value)		1~4	2

Daylight saving time setting (03H:read 10H: write)

Table 5-16 Daylight saving time address table

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
Daylight Saving Time Setting								
350H	848	DST enable	Word	R/W	0: disable; 1: enable	0	2~4	1
351H	849	DST format	Word	R/W	0: format 1(fixed date) 1: format 2 (non fixed date)	0	2~4	1
Format 1: Fixed Date								
352H	850	DST Start Month	Word	R/W	1~12	1	2~4	1
353H	851	DST Start Day	Word	R/W	1~31	1	2~4	1
354H	852	DST Start Hour	Word	R/W	0~23	0	2~4	1

355H	853	DST Start Min	Word	R/W	0-59	0	2~4	1
356H	854	DST Start Adjust time (Unit: Minute)	Word	R/W	1-120	60	2~4	1
357H	855	DST Ending Month	Word	R/W	1-12	1	2~4	1
358H	856	DST Ending Date	Word	R/W	1-31	1	2~4	1
359H	857	DST Ending Hour	Word	R/W	0-23	0	2~4	1
35AH	858	DST Ending Minute	Word	R/W	0-59	0	2~4	1
35BH	859	DST Ending Adjust time (Unit: minute)	Word	R/W	1-120	60	2~4	1
Format 2: Non Fixed Date								
35CH	860	DST Start Month	Word	R/W	1~12	1	2~4	1
35DH	861	DST Start Day	Word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	0	2~4	1
35EH	862	DST Start Week	Word	R/W	1~5	1	2~4	1
35FH	863	DST Start Hour	Word	R/W	0~23	0	2~4	1
360H	864	DST Start Minute	Word	R/W	0~59	0	2~4	1
361H	865	DST Start Adjust time (Unit: minute)	Word	R/W	1~120	60	2~4	1
362H	866	DST Ending Month	Word	R/W	1~12	1	2~4	1
363H	867	DST Ending Day	Word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	0	2~4	1
364H	868	DST Ending Week	Word	R/W	1~5	1	2~4	1
365H	869	DST Ending Hour	Word	R/W	0~23	0	2~4	1
366H	870	DST Ending Minute	Word	R/W	0~59	0	2~4	1
367H	871	DST Ending Adjust time (Unit: minute)	Word	R/W	1~120	60	2~4	1

Time of use(TOU) energy

Table 5-17 TOU Energy Address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
TOU Parameter								
400H	1024	Wrong Parameter Setting 1			See Appendix "Tariff Parameter Wrong Information 1"		2~4	1
401H	1025	Wrong Parameter Setting 2			See Appendix "Tariff Parameter Wrong Information 1"		2~4	1
402H	1026	Time Zone Selecting	Word	R/W	1-14	1	2~4	1
403H	1027	Schedule Setting: number of schedules to configure	Word	R/W	1-8	2	2~4	1
404H	1028	Segment Setting: number of time segments per schedule	Word	R/W	1-14	2	2~4	1
405H	1029	Tariff: number of tariffs to configure	Word	R/W	1-4	4	2~4	1
406H	1030	Weekend Setting:	Word	R/W	Bit0-bit6 1: weekdays; 0: weekends	0	2~4	1
407H	1031	Weekend Schedule	Word	R/W	1-8	1	2~4	1
408H	1032	Number of Holidays	Word	R/W	0-30	0	2~4	1
409H	1033	TOU auto reset fixed date: day (default is 1)	Word	R/W	1-28	1	2~4	1

40AH	1034	TOU auto reset fixed date: hour (default is 0)	Word	R/W	0-23	0	2~4	1
40BH	1035	TOU Enable	Word	R/W	0: disable; 1: enable	0	2~4	1
40CH	1036	TOU Settings Number	Word	R/W	0: System Setting 1: Communication	0	2~4	1
40DH	1037	Current number of tariffs to configure	Word	R/W	1-4 Only can change when TPU Tariff Number is set as 1, Communication	1	2~4	1
40EH	1038	TOU Settings - reset to factory default	Word	W	Only "0x0A" Valid		2~4	1
TOU Schedule Parameters								
420H-422H	1056-1058	Time Zone 1: starting Month, Day, schedule Table number		R/W		02-01 01	2~4	3
423H-425H	1059-1061	Time Zone 2: starting Month, Day, schedule Table number		R/W		06-01 02	2~4	3
426H-428H	1062-1064	Time Zone 3: starting Month, Day, schedule Table number		R/W		10-01 03	2~4	3
429H-42BH	1065-1067	Time Zone 4: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
42CH-42EH	1068-1070	Time Zone 5: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
42FH-431H	1071-1073	Time Zone 6: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3

432H-434H	1074-1076	Time Zone 7: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
435H-437H	1077-1079	Time Zone 8: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
438H-43AH	1080-1082	Time Zone 9: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
43BH-43DH	1083-1085	Time Zone 10: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
43EH-440H	1086-1088	Time Zone 11: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
441H-443H	1089-1091	Time Zone 12: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
444H-446H	1092-1094	Time Zone 13: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
447H-449H	1095-1097	Time Zone 14: starting Month, Day, schedule Table number		R/W		00-00 00	2~4	3
44AH-44CH	1098-1100	Schedule Table 1, 1st segment (Hour, Minute, Tariff Number)		R/W		07:12 01	2~4	3
44DH-44FH	1101-1103	Schedule Table 1, 2nd segment (Hour, Minute, Tariff Number)		R/W		15:22 03	2~4	3
450H-452H	1104-1106	Schedule Table 1, 3rd segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3

453H-455H	1107-1109	Schedule Table 1, 4th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
456H-458H	1110-1112	Schedule Table 1, 5th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
459H-45BH	1113-1115	Schedule Table 1, 6th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
45CH-45EH	1116-1118	Schedule Table 1, 7th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
45FH-461H	1119-1121	Schedule Table 1, 8th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
462H-464H	1122-1124	Schedule Table 1, 9th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
465H-467H	1125-1127	Schedule Table 1, 10th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
468H-46AH	1128-1130	Schedule Table 1, 11th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
46BH-46DH	1131-1133	Schedule Table 1, 12th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3

46EH-470H	1134-1136	Schedule Table 1, 13th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
471H-473H	1137-1139	Schedule Table 1, 14th segment (Hour, Minute, Tariff Number)		R/W		00:00 00	2~4	3
474H-49DH	1140-1181	Schedule Table 2, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
49EH-4C7H	1182-1223	Schedule Table 3, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
4C8H-4F1H	1224-1265	Schedule Table 4, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
4F2H-51BH	1266-1307	Schedule Table 5, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
51CH-545H	1308-1349	Schedule Table 6, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
546H-56FH	1350-1391	Schedule Table 7, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42
570H-599H	1392-1433	Schedule Table 8, 1st -14th segment (Hour, Minute, Tariff Number)		R/W		00:00:00	2~4	42

59AH-59CH	1434-1436	The 1st special day(Month, Day, schedule Table number)		R/W		03-12 01	2~4	3
59DH-59FH	1437-1439	The 2nd special day(Month, Day, schedule Table number)		R/W		09-10 02	2~4	3
5A0H-5A2H	1440-1442	The 3rd special day(Month, Day, schedule Table number)		R/W		05-02 03	2~4	3
5A3H-5A5H	1443-1445	The 4th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5A6H-5A8H	1446-1448	The 5th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5A9H-5ABH	1449-1451	The 6th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5ACH-5AEH	1452-1454	The 7th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5AFH-5B1H	1455-1457	The 8th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5B2H-5B4H	1458-1460	The 9th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5B5H-5B7H	1461-1463	The 10th special day(Month, Day, schedule Table number)		R/W		00-00 00	2~4	3
5B8H-5F3H	1464-1523	The 11th ~30th special day(Month, Day, schedule Table number)		R/W			2~4	3*20

Rate parameter error information word 1(basic parameter)

Table 5-18 Rate parameter error information word 1

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	1	1	1	1	1	1	1
Weekend seg set error	Holiday set error	Holiday no. over	Time zone set error	Time zone no. over	Time seg table no. over	Time seg no. over	Rate no. over

Rate parameter error information word 2(time segment table parameter)

Table 5-19 Rate parameter error information word 2

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	1	1	1	1	1	1	1
Time seg table 8 error	Time seg table 7 error	Time seg table 6 error	Time seg table 5 error	Time seg table 4 error	Time seg table 3 error	Time seg table 2 error	Time seg table 1 error

Alarm Parameter Setting(Function Code: 03H to Read; 10H to Write)

Table 5-20 Alarm Parameter

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
700H	1792	Alarm Switch	word	R/W	1: Enable; 0: Disable	0	2~4	1
701H	1793	Alarm Channel	word	R/W	Bit0~ Bit11: Alarm Channel 0-11 1: Enable; 0: Disable	0	2~4	1
702H	1794	Alarm Channel Output	word	R/W	Bit0~ Bit11: Alarm Channel 0-11 1: Enable; 0: Disable	0	2~4	1
703H	1795	Alarm Output Mode	word	R/W	0: level; 1: pulse	0	2~4	1

704H	1796	Pulse Output Time	word	R/W	50~3000ms (valid with Pulse Output Mode)	1000	2~4	1
Alarm Parameter Setting for the 1st group								
705H	1797	Parameter Number	Word	R/W	0~28 (please see appendix "Alarm Parameters comparison table")	0	2~4	1
706H	1798	Comparing Method	Word	R/W	0: larger; 1: equal; 2: less	0	2~4	1
707H	1799	Setpoint Value	Word	R/W		0	2~4	1
708H	1800	Delay Time	Word	R/W	0~3000 (×10ms)	0	2~4	1
Alarm Parameter Setting for the 2nd 12th group								
709H-73BH	1801-1851	The same as above	word	R/W			2~4	44

Table 5-21 SunSpec System Information Address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1000H-1001H	4096-4097	SunSpec_ID	Uint16	R	0x53756e53	1	1~4	2
1002H	4098	ID	Uint16	R	1	1	1~4	1
1003H	4099	Lenth	Uint16	R	65	65	1~4	1
1004H-1013H	4100-4115	Manufacturer	string	R	Well known value registered with SunSpec for compliance	Accuenergy	1~4	16
1014H-1023H	4116-4131	Model	string	R	Manufacturer specific value (32 chars)	AcuRev1300	1~4	16

1024H-102BH	4132-4139	Options	string	R	Manufacturer specific value (16 chars)	AcuRev130X	1~4	8
102CH-1033H	4140-4147	Version	string	R	Manufacturer specific value (16 chars)	H:1.10 S:1.01	1~4	8
1034H-1043H	4148-4163	Serial Number	string	R	Manufacturer specific value (32 chars)		1~4	16
1044H	4164	Device Address	uint16	R/W	Modbus device address		1~4	1
1045H	4165	ID	Uint16	R	Meter (Single Phase)single phase (AN or AB) meter --201 split single phase (ABN) meter –202 wye-connect three phase (abcn) meter—203 delta-connect three phase (abc) meter --204		1~4	1
1046H	4166	Lenth	Uint16	R	105		1~4	1
1047H	4167	Amps (total): Sunspec; Total Current: Acurev 1300	int16	R	0~9999 A		1~4	1
1048H	4168	Amps Phase A: Sunspec; Phase A Current: Acurev 1300	int16	R	0~9999 A		1~4	1
1049H	4169	Amps Phase B: Sunspec; Phase B Current: Acurev 1300	int16	R	0~9999 A		1~4	1

104AH	4170	Amps Phase C: Sunspec; Phase C Current: Acurev 1300	int16	R	0~9999 A		1~4	1
104BH	4171	Current scale factor: Sunspec; CT Ratio: Acurev 1300	sunssf	R	-3~+5 (used as exponent of a power of 10)		1~4	1
104CH	4172	Voltage LN (average): Sunspec; Phase Average Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
104DH	4173	Phase Voltage AN: Sunspec; Phase A Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
104EH	4174	Phase Voltage BN: Sunspec; Phase B Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
104FH	4175	Phase Voltage CN: Sunspec; Phase C Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
1050H	4176	Voltage LL (average): Sunspec; Line Average Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
1051H	4177	Phase Voltage AB: Sunspec; Line AB Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1

1052H	4178	Phase Voltage BC: Sunspec; Line BC Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
1053H	4179	Phase Voltage CA: Sunspec; Line CA Voltage: Acurev 1300	int16	R	0~9999 V		1~4	1
1054H	4180	Voltage scale factor: Sunspec;	sunssf	R	-2~2		1~4	1
1055H	4181	Frequency	int16	R	45Hz—65Hz		1~4	1
1056H	4182	Frequency scale factor	sunssf	R	-2		1~4	1

1057H	4183	Total Real Power: Sunspec; Total Active Power: Acurev 1300	int16	R	0~9999 W		1~4	1
1058H	4184	Watts phase A: Sunspec; Phase A Active Power: Acurev 1300	int16	R	0~9999 W		1~4	1
1059H	4185	Watts phase B: Sunspec; Phase B Active Power: Acurev 1300	int16	R	0~9999 W		1~4	1

105AH	4186	Watts phase C: Sunspec; Phase C Active Power: Acurev 1300	int16	R	0~9999 W		1~4	1
105BH	4187	Real Power scale factor: Sunspec;	sunssf	R	0 ~ 4		1~4	1
105CH	4188	AC Apparent Power VA: Sunspec; Total Apparent Power: Acurev 1300	int16	R	0~9999 VA		1~4	1
105DH	4189	VA phase A: Sunspec; Phase A Apparent Power: Acurev 1300	int16	R	0~9999 VA		1~4	1
105EH	4190	VA phase B: Sunspec; Phase B Apparent Power: Acurev 1300	int16	R	0~9999 VA		1~4	1
105FH	4191	VA phaseCA: Sunspec; Phase C Apparent Power: Acurev 1300	int16	R	0~9999 VA		1~4	1
1060H	4192	Apparent Power scale factor: Sunspec;	sunssf	R	0 ~ 4		1~4	1
1061H	4193	Reactive Power VAR: Sunspec; Total Reactive Power: Acurev 1300	int16	R	0~9999 var		1~4	1

1062H	4194	VAR phase A: Sunspec; Phase A Reactive Power: Acurev 1300	int16	R	0~9999 var		1~4	1
1063H	4195	4195 VAR phase B: Sunspec; Phase B Reactive Power: Acurev 1300	int16	R	0~9999 var		1~4	1
1064H	4196	VAR phase C: Sunspec; Phase C Reactive Power: Acurev 1300	int16	R	0~9999 var		1~4	1
1065H	4197	Reactive Power scale factor	sunssf	R	0 ~ 4		1~4	1
1066H	4198	Power Factor	int16	R	-1000 ~ 1000		1~4	1
1067H	4199	PF phase A	int16	R	-1000 ~ 1000		1~4	1
1068H	4200	PF phase B	int16	R	-1000 ~ 1000		1~4	1
1069H	4201	PF phase C	int16	R	-1000 ~ 1000		1~4	1
106AH	4202	Power Factor scale factor	sunssf	R	-3		1~4	1
106BH-106CH	4203-4204	Total Real Energy Exported: Sunspec Total Active Energy Exported: Acurev 1300	acc32	R/W	0-999999999 Wh		2~4	2
106DH-106EH	4205-4206	Total Watt-hours Exported in phase A: Sunspec; Total Active Energy Exported in Phase A: Acurev 1300	acc32	R/W	0-999999999 Wh		2~4	2

106FH-1070H	4207-4208	Total Watt-hours Exported in phase B: Sunspec; Total Active Energy Exported in Phase B: Acurev 1300	acc32	R/W	0-999999999 Wh		2~4	2
1071H-1072H	4209-4210	Total Watt-hours Exported in phase C: Sunspec; Total Active Energy Exported in Phase C: Acurev 1300	acc32	R/W	0-999999999 Wh		2~4	2
1073H-1074H	4211-4212	Total Real Energy Imported: Sunspec; Total Active Energy Imported: Acurev 1300	acc32	R/W	0-999999999 Wh		1~4	2
1075H-1076H	4213-4214	Total Watt-hours Imported phase A: Sunspec; Total Active Energy Imported in Phase A: Acurev 1300	acc32	R/W	0-999999999 Wh		1~4	2
1077H-1078H	4215-4216	Total Watt-hours Imported phase B: Sunspec; Total Active Energy Imported in Phase B: Acurev 1300	acc32	R/W	0-999999999 Wh		1~4	2

1079H-107AH	4217-4218	Total Watt-hours Imported phase C: Sunspec; Total Active Energy Imported in Phase C: Acurev 1300	acc32	R/W	0-999999999 Wh		1~4	2
107B	4219	TotWh_SF: Sunspec; CT ratio X PT ratio: Acurev 1300	sunssf	R	-3 ~ 0		1~4	1
107CH-107DH	4220-4221	Total VA-hours Exported: Sunspec; Total Apparent Power Exported: Acurev 1300	acc32	R/W	0-999999999 VAh		3~4	2
107EH-107FH	4222-4223	Total VA-hours Exported phase A: Sunspec; Total Apparent Power Exported in Phase A: Acurev 1300	acc32	R/W	0-999999999 VAh		3~4	2
1080H-1081H	4224-4225	Total VA-hours Exported phase B: Sunspec; Total Apparent Power Exported in Phase B: Acurev 1300	acc32	R/W	0-999999999 VAh		3~4	2
1082H-1083H	4226-4227	Total VA-hours Exported phase C: Sunspec; Total Apparent Power Exported in Phase C: Acurev 1300	acc32	R/W	0-999999999 VAh		3~4	2

1084H-1085H	4228-4229	Total VA-hours Imported: Sunspec; Total Apparent Power Imported: Acurev 1300	acc32	R/W	0-999999999 VAh		2~4	2
1086H-1087H	4230-4231	Total VA-hours Imported phase A: Sunspec; Total Apparent Power Imported in Phase A: Acurev 1300	acc32	R/W	0-999999999 VAh		2~4	2
1088H-1089H	4232-4233	Total VA-hours Imported phase B: Sunspec; Total Apparent Power Imported in Phase B: Acurev 1300	acc32	R/W	0-999999999 VAh		2~4	2
108AH-108BH	4234-4235	Total VA-hours Imported phase C: Sunspec; Total Apparent Power Imported in Phase C: Acurev 1300	acc32	R/W	0-999999999 VAh		2~4	2
108CH	4236	TotVAh_SF: Sunspec; CT ratio X PT ratio: Acurev 1300	sunssf	R	-3 ~ 0		2~4	1
108DH-108EH	4237-4238	Total VAR-hours Imported Q1: Sunspec;	acc32	R/W	0-999999999 varh		2~4	2
108FH-1090H	4239-4240	Total VAR-hours Imported Q1 phase A	acc32	R/W	0-999999999 varh		2~4	2

1091H-1092H	4241-4242	Total VAR-hours Imported Q1 phase B	acc32	R/W	0-999999999 varh		2~4	2
1093H-1094H	4243-4244	Total VAR-hours Imported Q1 phase C	acc32	R/W	0-999999999 varh		2~4	2
1095H-1096H	4245-4246	Total VAR-hours Imported Q2	acc32	R/W	0-999999999 varh		2~4	2
1097H-1098H	4247-4248	Total VAR-hours Imported Q2 phase A	acc32	R/W	0-999999999 varh		2~4	2
1099H-109AH	4249-4250	Total VAR-hours Imported Q2 phase B	acc32	R/W	0-999999999 varh		2~4	2
109BH-109CH	4251-4252	Total VAR-hours Imported Q2 phase C	acc32	R/W	0-999999999 varh		2~4	2
109DH-109EH	4253-4254	Total VAR-hours Exported Q3	acc32	R/W	0-999999999 varh		2~4	2
109FH-10A0H	4255-4256	Total VAr-hours Exported Q3 phase A	acc32	R/W	0-999999999 varh		2~4	2
10A1H-10A2H	4257-4258	Total VAr-hours Exported Q3 phase B	acc32	R/W	0-999999999 varh		2~4	2
10A3H-10A4H	4259-4260	Total VAr-hours Exported Q3 phase C	acc32	R/W	0-999999999 varh		2~4	2
10A5H-10A6H	4261-4262	Total VAr-hours Exported Q4	acc32	R/W	0-999999999 varh		2~4	2
10A7H-10A8H	4263-4264	Total VAr-hours Exported Q4 phase A	acc32	R/W	0-999999999 varh		2~4	2
10A9H-10AAH	4265-4266	Total VAr-hours Exported Q4 phase B	acc32	R/W	0-999999999 varh		2~4	2

10ABH-10ACH	4267-4268	Total VAr-hours Exported Q4 phase C	acc32	R/W	0-999999999 varh		2~4	2
10ADH	4269	TotVArh_SF: Sunspec; CT ratio X PT ratio: Acurev 1300	sunssf	R	All the energy use the same SF		2~4	1
10AEH-10AFH	4270-4271	Meter Event Flags	bitfield32	R	0	0	1~4	2
10B0H	4272	SunSpec_end_ID: Sunspec;	Uint16		0xFFFF		1~4	1
10B1H	4273	SunSpec_end_ lenth: Sunspec	Uint16		0x0000		1~4	1

Maximum demand and time of occurrence(03H:read)

Table 5-22 Maximum demand and time of occurrence address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
Currentmaximum demand and time of occurrence data							
1600H-1601H 1602H-1604H	Input active power's total max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss (Second always be 0)		3,4	2 3
1605H-1606H 1607H-1609H	Input active power rate1 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
160AH-160BH 160CH-160EH	Input active power rate2 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
160FH-1600H 1611H-1613H	Input active power rate3 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1614H-1615H 1616H-1618H	Input active power rate4 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1619H-161AH 161BH-161DH	output active power's total max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
161EH-161FH 1620H-1622H	output active power rate1 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1623H-1624H 1625H-1627H	output active power rate2 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1628H-1629H 162AH-162CH	output active power rate3 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
162DH-162EH 162FH-1631H	output active power rate4 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3

1632H-1633H 1634H-1636H	Input reactive power's total max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1637H-1638H 1639H-163BH	Input reactive power rate1 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
163CH-163DH 163EH-1640H	Input reactive power rate2 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1641H-1642H 1643H-1645H	Input reactive power rate3 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1646H-1647H 1648H-164AH	Input reactive power rate4 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
164BH-164CH 164DH-164FH	output reactive power's total max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1650H-1651H 1652H-1654H	output reactive power rate1 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1655H-1656H 1657H-1659H	output reactive power rate2 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
165AH-165BH 165CH-165EH	output reactive power rate3 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
165FH-1660H 1661H-1663H	output reactive power rate4 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1664H-1665H 1666H-1668H	apparent power total max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1669H-166AH 166BH-166DH	A phase current max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
166EH-166FH 1670H-1672H	B phase current max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3

1673H-1674H 1675H-1677H	C phase current max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1678H-1690H	reserved						

Event logging (03H:read)

Table 5-23 Event logging

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1D00H-1D01H	7424-7425	Total times of Event Reset (Total Reset and Each Parameter Reset)	word	R	0~0xFFFFFFFF		2~4	2
Last Event Reset Record								
1D02H-1D04H	7426-7428	Event Reset Happening Time	word	R	YY/MM/DD/hh/mm/ss		2~4	3
1D05H	7429	Event Reset Marking Code	word	R	1: Reset Event Record;2: Reset Demand Record;3:Reset Meter Opening Record;4: Reset Alarm;5: Reset Meter Operation Time;6:Reset Time of Meter Operation with Load;		2~4	1
Last 2nd Event Reset Record								
1D06H-1D09H	7430-7433						2~4	8
Last 3rd Event Reset Record								
1D0AH-1D0DH	7434-7437							

Programming record

Table 5-24 Programming record address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1A00H-1A01H	6656-6657	total programming time	Dword	R	0-999999		2~4	2
last time programming record								
1A02H-1A04H	6658-6660	occur time	word	R	YYMMDDhhmmss		2~4	3
1A05H	6661	programming event flag	word	R			2~4	1
last 2nd time –last 3rd time								
1A06H-1A0DH	6662-6669						2~4	8

Note*:
System Event Marking:
01: Meter Address Change 02: RS485 Parameter Change (including Baud Rate and Parity bit setting)
03: Energy Pulse Setting 04: Demand Parameter Setting(calculation method, demand period, slipping time) 05: Reactive power calculation method 06: VAR/PF Convention 07: Date and Time Setting 08: Measure side change 09: Wiring Mode 10: CT or PT change 11: Pulse Constant and Pulse Width 12: Decimal Digits 13: RO Output Mode 14: Alarm Setting Parameter
100: Energy Value Base 101: TOU Parameter Setting
102: Daylight Saving Time 103: Trend Record
104: Alarm set parameters change

Demand clearance event

Table 5-25 Demand clearance address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1B00H-1B01H	6912-6913	Total Times of Demand Reset	word	R	0~0xFFFFFFFF		2~4	2
last time demand clearance record								

1B02H-1B04H	6914-6916	occur time	word	R	YYMMDDhhmmss		2~4	3
last 2nd -3rd time								
1B05H-1B0AH	6917-6922						2~4	6

Open cover record

Table 5-26 Open cover record address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1C00H-1C01H	7168-7169	total open cover time	word	R	0-999999		2~4	2
last time open cover record								
1C02H-1C04H	7170-7172	occur time	word	R	YYMMDDhhmmss		2~4	3
1C05H-1C07H	7173-7175	end time	word	R			2~4	3
last 2nd -3rd time								
1C08H-1C13H	7176-7187						2~4	12

Event clearance

Table 5-27 Event clearance address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX	Decimal							
1D00H-1D01H	7424-7425	total event clearance time	word	R			2~4	2
last time event clearance record								
1D02H-1D04H	7426-7428	occur time	word	R	YYMMDDhhmmss		2~4	3

1D05H	7429	event clearance data flag	word	R	1: clear the programming records 2: clear demand records 3: clear open cover records		2~4	1
last 2nd -3rd time								
1D06H-1D0DH	7430-7437						2~4	8

Meter clearance event

Table 5-28 Meter clearance address

Modbus address		Parameter description	Data type	R/W	Data range	Default	Model	Register number
HEX								
1E00H-1E01H	7680-7681	total meter clearance time	word	R	0-999999		2~4	2
last time meter clearance record								
1E02H-1E04H	7682-7684	occur time	word	R	YYMMDDhhmmss		2~4	3
last 2nd -3rd time								
1E05H-1E0AH	7685-7690						2~4	6

RO control function(01H read,05H write)

RO state read(01H)

Table 5-29 RO control function-01H Read

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
0000H	RO state	word	R	1:ON 0:OFF			1

RO control(05H)

Table 5-30 RO control function-05H Write

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
0000H	RO control	word	W	FF00: ON 0000: OFF			1

Appendix

Appendix A Function List

Function	AcuRev 1301	AcuRev 1302	AcuRev 1303	AcuRev 1304
Bi-directional Energy Measurements			●	●
Active Energy	●	●	●	●
Reactive Energy			●	●
Apparent Energy		●	●	●
TOU		●	●	●
Power Demand		●	●	●
Peak Power Demand		●	●	●
Predictive Demand		●	●	●
Current Demand		●	●	●
Peak Current Demand		●	●	●
Voltage	●	●	●	●
Current	●	●	●	●
Neutral Current	Calculated	Calculated	Calculated	●
Residual current				Calculated
Active Power	●	●	●	●
Reactive Power		●	●	●
Apparent Power		●	●	●
Power Factor		●	●	●
Frequency		●	●	●
Clock		●	●	●
Running TIme	●	●	●	●
Energy Pulse Output	●	●	●	●
Alarm Output		●	●	●
Alarm event		●	●	●
Relay Output		⊙	⊙	⊙
RS485 Modbus-RTU		●	●	●
Wiring Check	●	●	●	●
Tempreture	●	●	●	●

● fixed function ⊙ Optional function Blank: no this function

Appendix B Technical Specifications and Parameters

The transformer connected to the measurement			
Parameter	Accuracy	Resolution	Range
Active energy	0.5%	0.1kWh	0-999999.9
Reactive energy	0.5%	0.1kvar	0-999999.9
Apparent energy	0.5%	0.1kVAh	0-999999.9
Voltage	0.5%	0.1V	175.0V-265.0V
Current	0.5%	0.001A	100mA-80A
Active power	0.5%	0.1W	-80-80kW
Reactive power	0.5%	0.1var	-80-80kvar
Apparent power	0.5%	0.1VA	-80-80kVA
Power factor	0.5%	0.001	-1.000-1.000
Frequency	0.2%	0.01Hz	50/60
Power demand	0.5%	0.1W/var/VA	80kW/kvar/KVA
Current demand	0.5%	0.001A	80A

Power Supply	
Working Power Supply	100-415Vac,50/60Hz; 100-300Vdc
Power Consumption	<2W or <10VA

Pulse Output	
Isolation voltage	2500Vac
Load Voltage	0-25Vac
Load current	10mA(max)

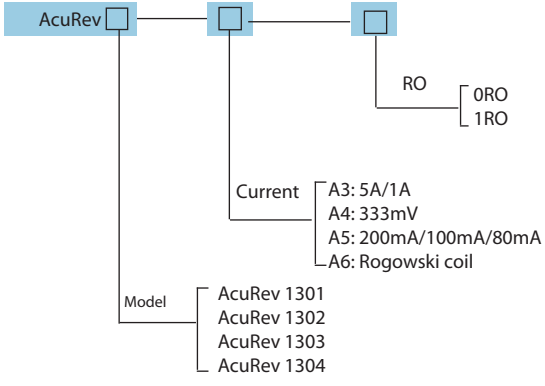
Relay Outpur	
Load Voltage	250Vac30Vdc
Max Load current	5A(Resistant Load)
Isolation voltage	2000Vac(1min)
Action Time	10ms
Mechanical Life	20million times
Electrical Life	Above 50,000Times(5A,250Vac,Resistant Load)

Communication	
RS485Baud Rate	1200-38400
Communication protocol	Modbus-RTU
Infrared Communication	Non- contact infrared
Infrared Baud Rate	1200

Environment	
Working temperature	-25-70°C
Storage temperature	-40-85°C

Appendix C Ordering Information

Ordering description



Appendix D Revision History

Version	Date	Description
V2.01	20141021	First version
V2.02	20150923	

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