AcuRev 1200

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 1200 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 high voltage and current devices. Accuenergy shall not be responsible or liable for any damages or injuries caused by improper meter installation and/or operation.

Contents

Welcome to AcuRev 1200!

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

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

Chapter 1 Introduces the basic AcuRev 1200 features and application areas.

Chapter 2 Introduces AcuRev 1200 installation and wiring methods in detail.

Chapter 3 Walks through how to operate AcuRev 1200 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 1200 technical specifications and ordering information.

Chapter 1 Introduction

1.1 Meter Overview

AcuRev 1200 series rail-mounted three phase energy meter has a small size and high accuracy, and has access to 80A current directly. 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 informations. It is ideal for building energy management systems, energy monitoring and energy metering systems.

- **Energy**

Real Energy: Total Real Energy, Net Real Energy, Consumed Real Energy, Generated Real Energy

Reactive Energy: Total Reactive Energy,Net Reactive Energy,Consumed Reactive Energy,Generated Reactive Energy

Apparent Energy: Apparent Energy

Time Of Use Energy Measurement: Real Energy under the four tariff, Time Of Use Reactive Energy Measurement;

- **Measurement Funtion**

AcuRev 1200 series meters provide measurement and indication functions. Which can measure Voltage, Current, Power, Frequency and Power Factor,and also have load characteristics indication function. Different specifications of the meters have different functions.

- **Demand**

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

- **System Event Logging**

The product can record the time and event ID about some important parameters.

- **Data storage and load trend**

The product has Non-volatile memory of 8M byte, which can store time-stamped real-time measurement parameters and energy data. Users could depict power parameters and load consumption trends by using the stored data. This function just adapt to AcuRev 1204.

- **Communication**

Supports RS485 communication port and infrared port. Supports 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 1200 series meter has data collection and management function, energy measurement and multi-parameters measurement function, and demand measurement, event logging, trend record function.

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

- **Small size, Convenient installation**

AcuRev 1200 series products' appearance and dimension comply with the IEC 35mm DIN standard, accounts for only 4 mold.

- **Intuitive Display**

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

- **Safety**

AcuRev 1200 series product has electronic seal function and physical seal. Users cannot change the parameters through the keys when the electronic seal is in sealed, and important parameters cannot be changed through communication, preventing malicious data changement.

Chapter 2 Installation

2.1 Appearance and Dimensions

2.2 Installation Methods

2.3 Wiring

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 contacting 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 contacting 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 replacement of the battery must be performed by professionals.

This chapter mainly described how to install an AcuRev 1200 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 1200 Appearance

Dimensions:

Unit: mm

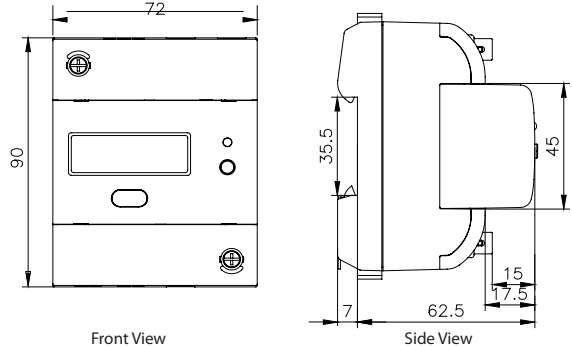


Figure 2-2 Meter base dimensions

2.2 Installation Methods

Note

Temperature and humidity of the environment must accord with the requirement of Acurev 1200, Otherwise it may cause the meter damaged.

Environmental

Before installation, please check the temperature and humidity to ensure the AcuRev 1200 series meter is being placed where it will not be damaged.

1. Temperature

AcuRev 1200's operating temperature range is -25~70°C. Exceeding this temperature range will cause damage to the meter. Please note that it will influence the meter's working life negatively if the meter operates in extremely high or extremely low temperatures. AcuRev 1200's storage temperature range is -40~85°C.

2. Humidity

5% to 95% non-condensing.

3. Location

AcuRev1200 series meter should be installed in a dry and dust free environment. Avoid exposing meter to excessive heat, radiation and high electrical noise sources.

Installation Steps:

This meter is DIN rail mounted, which fits 35 mm standard rails.

1. Insert the meter groove all the way into the rail, and flip the meter case as Figure below shows, making the meter mounted into the rail.

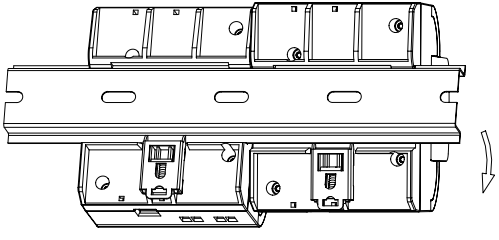


Figure 2-3 Step A

2. Use the metal clips to tighten the rail and installation will be completed.

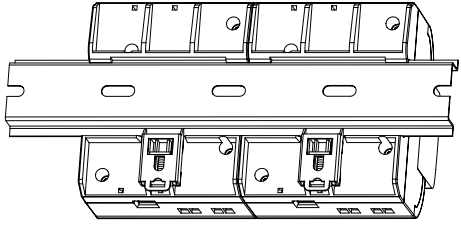


Figure 2-4 Step B

2.3 Wiring

Terminals:

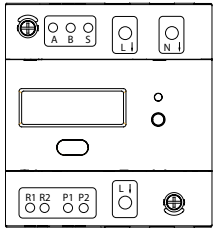


Figure 2-5 Meter base terminals

Upper row: Current Input, Serial Communication

Lower row: Current Output, Digital Output, Relay Output

Wiring:

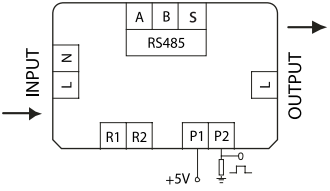


Figure 2-6 wiring

Communication:

AcuRev1200 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 cupper net of the Shielded Twisted Pair(STP) in the shielding layer. The maximum distance of STP is 1200m. The distance will be shorter if more devices 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 be utilized. Typical RS485 network topologies include line, circle and star.

In order to improve communication quality:

1. High-quality Shielded Twisted Pair is very important, AWG22 (0.6mm^2) or bolder is recommended. Two cables should be different colors.

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

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

4. "T" type connection topology should be avoided. This means no new branches except from 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, an anti-signal reflecting resistor (typical value 120-300 ohm, 0.25W) is often used at the end of 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. An infrared port is also available in the Display Module, which supports meter reading.

Chapter 3 Operation and Application

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

3.1 Display Panel and Keys

Chapter 2.1 shows the appearance 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.

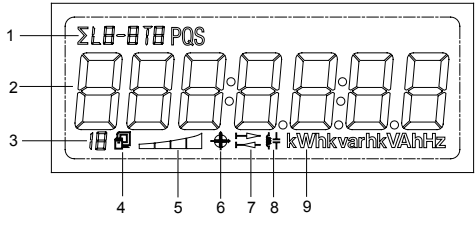


Figure 3-1 All LCD display lighten

Table 3-1 Display Content

NO.	Content	Description
1	Description area	To display what kind of parameter in the display area. Including Chinese and English description. Distinguish Energy, Combined and Split phase power, Current, Demand, Parameter Setting etc.
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		To indicate whether the meter is in the all information mode or not.
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 power

6	 Four-quadrant reactive energy display	To indicate the first to forth quadrant reactive energy
7		Input icon on: display the Consumed Energy Output icon on: display the Generated Energy
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 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 backlight is lit up, during this time, pressing 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 don't press any key within one minute, then it would display all the pages in a rate of 6 second perpage automatically.

System default display content:

a) Total Real Energy (adapted to AcuRev1201~AcuRev1204)

b) Total Reactive Energy (just adapted to AcuRev1203,AcuRev1204)

Custom data content: The 9^{th} -61^{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: Setting corresponding flag to 1 through communication, the consequence would be added to the important parameter display area to cycle display, and 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.

2. All parameter display mode

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			Meter address	√	√	√	√
2			RS485 communication baud rate		√	√	√
3			RS485 communication check mode		√	√	√
4			Hardware version	√	√	√	√
5			Software version	√	√	√	√
6			Release date	√	√	√	√
7			Type specification	√	√	√	√
8			Total real energy	√	√	√	√
9-12	1	Optional display flag word 1 - Bit0	Total real energy tariff 1-4			√	√
13	2	Optional display flag word 1 - Bit1	Net real energy	√	√	√	√
14-17	3	Optional display flag word 1 - Bit2	Net real energy tariff 1-4			√	√

Page	No.	Setting flag	Content	Model 1	Model 2	Model 3	Model 4
18	4	Optional display flag word 1 - Bit3	Consumed real energy	√	√	√	√
19-22	5	Optional display flag word 1 - Bit4	Consumed real energy tariff 1-4			√	√
23	6	Optional display flag word 1 - Bit5	Generated real energy	√	√	√	√
24-27	7	Optional display flag word 1 - Bit6	Generated real energy tariff 1-4			√	√
28			Total reactive energy			√	√
29-32	8	Optional display flag word 1 - Bit7	Total reactive energy tariff 1-4			√	√
33	9	Optional display flag word 1 - Bit8	Net reactive energy			√	√
34-37	10	Optional display flag word 1 - Bit9	Net reactive energy tariff 1-4			√	√
38	11	Optional display flag word 1 - Bit10	Consumed reactive energy			√	√
39-42	12	Optional display flag word 1 - Bit11	Consumed reactive energy Tariff 1-4			√	√
43	13	Optional display flag word 1 - Bit12	Generated reactive energy			√	√
44-47	14	Optional display flag word 1 - Bit13	Generated reactive energy Tariff 1-4			√	√
48	15	Optional display flag word 1 - Bit14	Total apparent energy			√	√
49	16	Optional display flag word 1 - Bit15	Voltage		√	√	√
50	17	Optional display flag word 2 - Bit0	Current		√	√	√
51	18	Optional display flag word 2 - Bit1	System real power		√	√	√
52	19	Optional display flag word 2 - Bit2	System reactive power			√	√

Page	No.	Setting flag	Content	Model 1	Model 2	Model 3	Model 4
53	20	Optional display flag word 2 - Bit3	System apparent power			√	√
54	21	Optional display flag word 2 - Bit4	System power factor			√	√
55	22	Optional display flag word2 - Bit5	Frequency		√	√	√
56	23	Optional display flag word2 - Bit6	Real Power demand			√	√
57	24	Optional display flag word2 - Bit7	Reactive power demand			√	√
58	25	Optional display flag word2 - Bit8	Apparent power demand			√	√
59	26	Optional display flag word2 - Bit9	Current demand			√	√
60	27	Optional display flag word2 - Bit10	Current time			√	√
61	28	Optional display flag word2 - Bit11	Current time			√	√
62			End the screen	√	√	√	√

3. Setting mode

Short press the "set" key, we'll go into the setting mode: Password authentication. When it is succeed ,goes to the address setting page, otherwise drops out of the setting mode and goes into the important parameter display mode; when the seal key detected is sealed, 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.

Table 3-3 ModBus RTU protocol data coding table

Display	Content	Specification 1	Specification 2	Specification 3	Specification 4
Meter address	Meter address	S-01	S-01	S-01	S-01
RS485 communication	Baud rate		S-02	S-02	S-02
	Check mode		S-03	S-03	S-03
Energy pulse value option	Energy pulse value option	-	-	S-04	S-04
Demand setting	Demand calculation mode			S-05	S-05
	Cycle			S-06	S-06
	Slip time	-	-	S-07	S-07
Reactive calculation	Reactive calculation mode	-	-	S-08	S-08
PF/VAR statue option	PF/VAR statue option	-	-	S-09	S-09
Change password	Change password	S-02	S-04	S-10	S-10
Display interface customize	Display interface customize:add	S-03	S-05	S-11	S-11
	Display interface customize:delete	S-04	S-06	S-12	S-12
Date setting	Date setting	-	-	S-13	S-13
Time setting	Time setting	-	-	S-14	S-14

Each mode display area distinction as follows:

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

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

Keys presentation:

1. Seal key: Used as electronic seal function.

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

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

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

3. SCOLL: Used to change pages in the important parameter mode and all parameter mode; In 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:

A) 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.

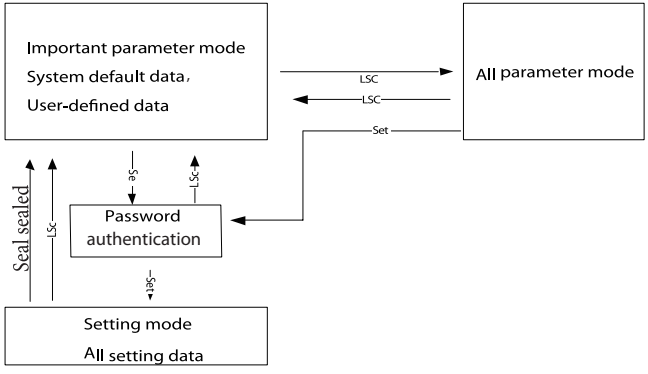
Setting mode: Change pages and data.

B) 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: If there's any pressing action, the backlight would be lighten. After no action for 90s, the backlight is off.

3.3 All Parameter Display and Key Operations

In the all parameter display mode, short time press the "SCOLL" key to display different parameters. The change sequence is from the 1st to the 62th screen (If the chosen specification doesn't support the function , just skip it). When it comes to the last screen, press the"SCOLL" key for a short time to back to the 1st screen.

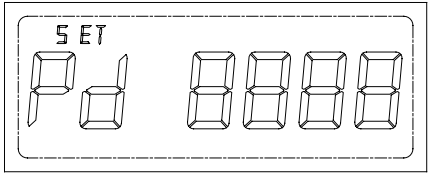
3.4 Settings and Key Operations

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

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

A) Password protection inquiry

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



Enter the password key operation:

Short press "SCOLL" key (Sc): The number in the cursor position plus 1, when the number is 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 is blinking, press "Set" again, and go to the password inquirty page. 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

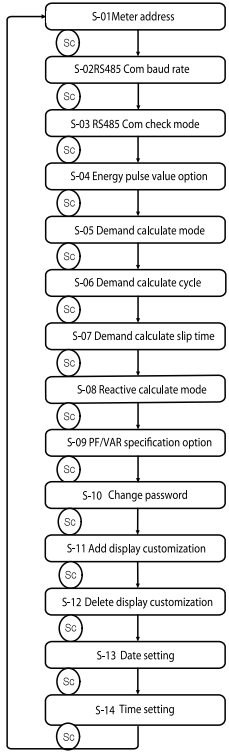
Operation description:

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

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

"Set" key could change the cursor's blinking state, cursor's movement,and confirm the setting data(which is changing from cursor blinking state to no cursor blinking state.). Illegal number could not be set and the data would not change.

Different specifications support different setting data. Take AcuRev 1203 for example.



Address range: 1-247

Choose from1200 2400,4800,9800,38400bps

Choose from EVEN, ODD,NON1,NON2

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

0:Sliding Block Method1:Fixed Block Method
2:Rolling Block Method 3: Thermal Demand Method

1-30min

1-30min, demand cycle must be integer multiples of slip time

0: real reactive 1:broadly reactive

IEC,IEEE

Change password

Add display screen to cycle mode

Delete screen from cycle mode

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 functions 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 1200 series meters support different parameters, you'll see the details in the function table. Take AcuRev 1203 for example.

4.1 Parameter settings

AcuRev 1200 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.

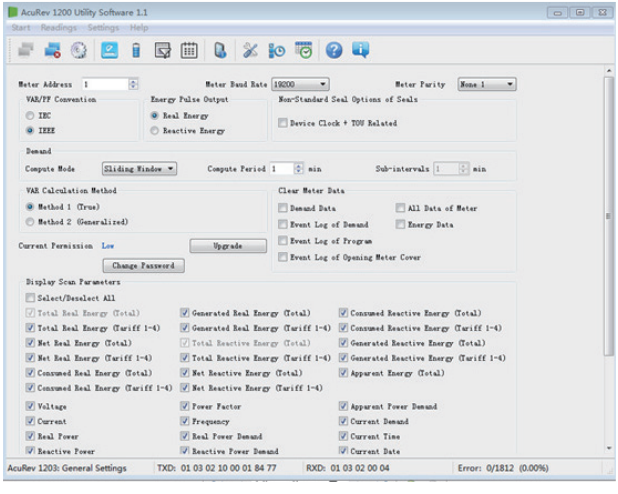


Figure 4-1 Basic setting parameters in the software

1) Reactive power formula

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

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

2) Energy pulse generated

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

Real: P1,P2 terminals generated pulse is real energy pulse.

Reactive: The generated pulse is reactive energy pulse.

3) Demand

Demand supports 4 kinds of calculate methods, which are 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, and the demand value updates once. 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) Seal option

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

5) Communication authority

Divided into low authority and high authority.

Low authority: Important operations (like initial energy data and clear demand event record, programming event record, open cover event record, meter data, energy data) disable. But it can update to high authority through updating the communication authority.

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

6) Cycle parameters

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

4.2 Basic Measurement Functions

AcuRev 1200 mainly measure the Voltage, Current, Power, Frequency, Power Factor, Demand. Demand supports power demand and current demand.

The figure below is the basic measurement parameter display.

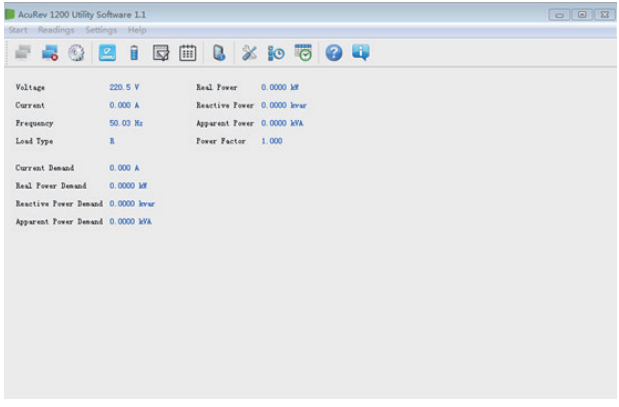


Figure 4-2 Basic Measurement Parameter Display

4.3 Energy

AcuRev 1200 series meters provide time of use double direction real-time energy. The boundaries of time could be any day during the date 1-28. Real–time energy can change the energy base. The value only can be changed under the high authority and sealing open condition. The supporting energy parameters include Total Real Energy, Net Real Energy, Consumed Real Energy, Generated Real Energy, Total Reactive Energy, Net Real Energy,Consumed Reactive Energy, Generated Reactive Energy, Apparent Energy.

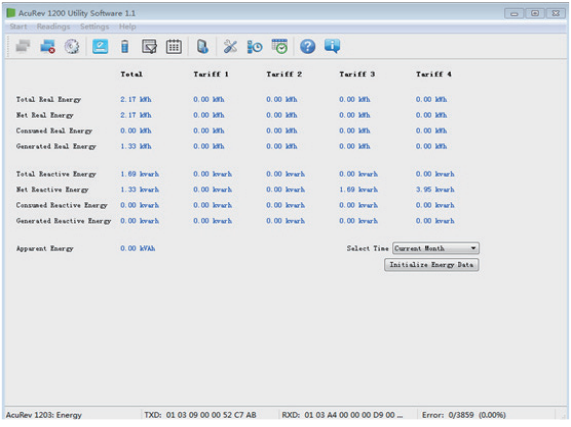


Figure 4-3 Calculation and Measurement Parameter Display

Supports time of use energy.

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 tariff (at most 4 kinds of tariff). The meter decides which tariff the current time should belong to according to its inner clock or communication command. To achieve TOU calculation and chargement function, the TOU energy should be calculated separately in different tariff.

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

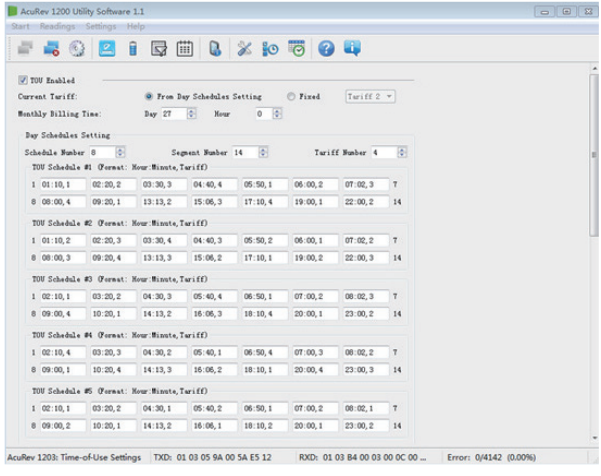


Figure 4-4 TOU Energy Setting Display

a) The current rate of value from the internal clock

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

User can use different time blocks, different time segments 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 the TOU function is set, the meter would process the TOU calculate energy. If it is wrong and has opened the TOU function. The energy just cumulated to tariff 1.

Time setting demands:

1. Season setting parameter: The calendar year will be divided up into different seasons depending on the season setting parameter. The parameter can be selected from any integer between 1 to 14. User must enter the correct value for the season setting parameter in accordance to the TOU season table. For example, if the season setting parameter is set as 2, the first 2 slots of the TOU season table must be set, otherwise it will be considered as an invalid input (TOU function will be disabled).

2. TOU season format: Enter the start date into the TOU season table slot following this format "MM-DD ID" - MM stands for the month, DD stands for the day and ID stands for the TOU schedule ID (available from 01 to 14). The dates should be organized so that they are in sequence according to the calendar year (the earlier date comes first and the later date comes last). For example, if 3 seasons are selected, the date parameters are January 1, June 6 and September 7, and TOU schedule 02, 01, 03 will be used respectively, the first TOU season table slot shall enter 01-01 02, the second slot shall enter 06-06 01, and the third slot shall enter 09-07 03. Entering 01-01 02 for the first slot, 09-07 03 for the second slot and 06-06 01 for the third slot is considered invalid.

3. Schedule setting parameter: The number of available TOU schedules depends on the schedule setting parameter. The parameter can be selected from any integer between 1 to 14. This parameter determines the number of TOU schedules available for the TOU calendar setting. A maximum of 8 TOU schedules (from TOU Schedule #1 to TOU Schedule #8) can be used.

4. Segment setting parameter: Each TOU schedule consists of various timing segments. The number of segments depends on the segment setting parameter setup. The parameter can be selected from any integer between 1 to 14 (inclusively). User must enter the correct value for the segment setting parameter in accordance to the TOU schedule table. If the segment setting parameter is set as 3, the first 3 slots of the TOU schedule table must be set, otherwise, it will be considered as an invalid input (TOU function will be

disabled).

5. Tariff setting parameter: This parameter corresponds to the number of tariffs available for the TOU calendar and can be selected from any integer from 1 to 4. The four tariffs: sharp, peak, valley and normal are represented by 4 integers: 1,2,3 and 4 respectively. If the tariff setting parameter is set to 4, all of the 4 tariffs will be available for the TOU calendar; if the parameter is set to 2, only the first 2 tariffs (sharp and peak) will be available.

6. Holiday setting parameter: This parameter can be set from any integer between 1 and 30, meaning a maximum of 30 holidays can be programmed to the TOU calendar. If the holiday setting parameter is set as 3, the first 3 slots of the holiday schedule must be set, otherwise it will be considered as an invalid input (TOU function will be disabled).

Note: User can either customize the TOU calendar factory settings or use the default factory settings. User can reset the TOU calendar to its default value either via communication or from the meter front.

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 during the setting time segment, the energy would increase under the corresponding tariff.

Note: TOU 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 rest funtion.

7. Weekend Schedule: Weekend Setting (bit0: Sunday; bit1-bit6: Monday to Saturday; 1 means not effective, and 0 means effective). For example, when the Weekend Setting bit0 is 0 means Sunday is effective. When the Weekend Setting bit1 is 0, it means Monday is effective. When the meter clock is within the preset Weekend Schedule, the energy will

accumulate under the tariff that corresponds to the schedule.

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

8. Daylight saving time (DST): Daylight saving time can be enabled in one of two formats: The fixed date option, or a fixed day of one of the weeks in the month (also named as the non-fixed date option). If you choose a fixed date option, you set the format according to a fixed date, for the daylight saving time switch: The format month / day / hour / minute / adjust time (in minutes). If you choose non-fixed date option, DST will be implemented by which day of which week, whose setting format is month/which day (i. e. Tuesday)/which week (i. e. 1st week)/hour/minute/adjust time(in minutes). By using the function, you can cause the instrument to automatically switch to and from daylight saving time. When the clock starts to run to daylight saving time, the meter will automatically adjust the clock to a time period in advance, while the clock is running to the end of daylight saving time, meter will automatically adjust the clock pushed back to a time period.

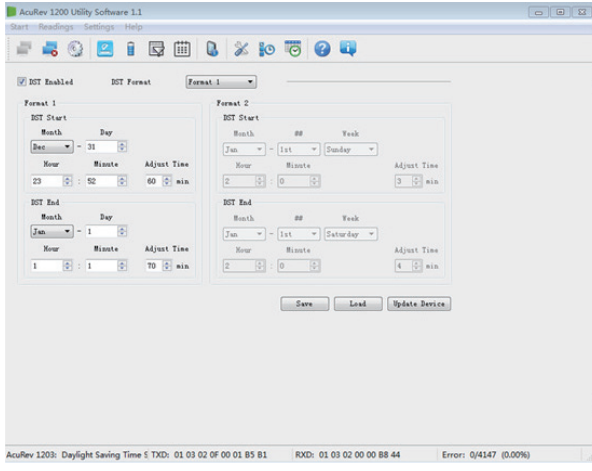


Figure 4-5 Daylight Saving Time Setting Display

4.4 Demand

Demand have four calculation methods: Sliding block method, fixed block method, rolling block method, thermal demand method. Users can clear the demand.

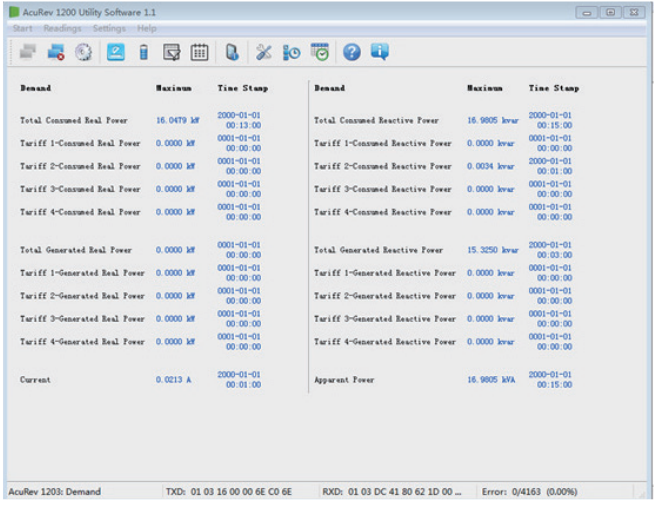


Figure 4-6 Demand Parameter Display

4.5 RO function

AcuRev1200 have relay output (RO), all the way to realize the remote control.

4.6 Event Logging

The meter supports the event logging of important operations. Including programming event, open meter cover event, demand clearance event, 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, including baud rate, check mode.
03	Reserved
04	Reserved
05	Energy pulse programming event
06	Demand related programming event, including demand calculate method, demand calculate period, slid time.
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 logging.

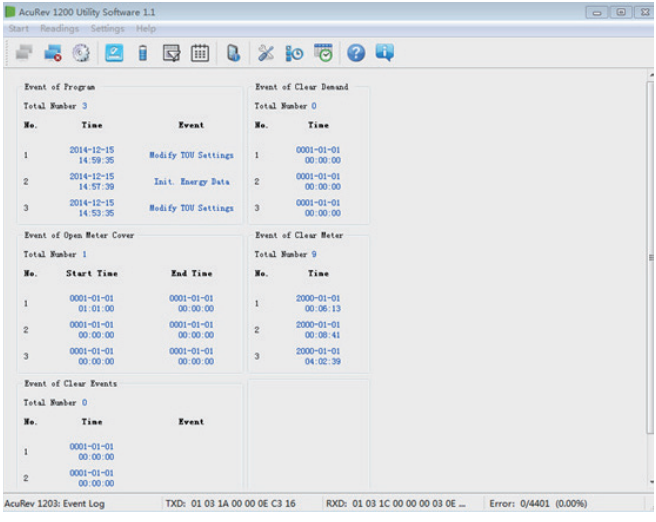


Figure 4-7 Event Clearance Record Display

4.7 Meter Information

Meter type, hardware version, software version, release date, serial number and other basic information as well as the meter running word and real-time clock are available through the meter's information interface.

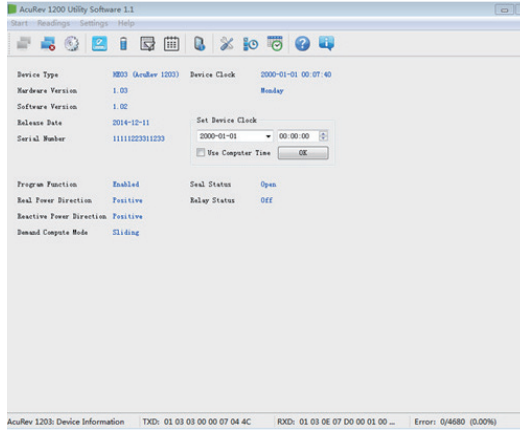


Figure 4-8 Meter Information Display

4.8 Seal function

AcuRev1200 series meters support seal function. When the seal is open, the read& write operation is not limited.When the seal is sealed , the read operation is not limited.but the write operation is not allowed, including communication and key change.

From 20FH, we could know the user's content that needed to be shield when the seal is sealed. When the seal is closed, the user-defined nonstandard contend is valid.

From 107H, we can see if the seal state is valid. When the sealing key is invalid, the address displays open seal state. When the seal is valid the address displays (both 2 seal keys are valid), seal state, and the corresponding content would be shield.

20FH	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
209H	Pulse option	√	√
20AH	Demand calculation method option	√	√
20BH	Demand calculation cycle	√	√
20CH	Demand calculation slid time	√	√
20DH	Reactive power calculation method	√	√
20EH	VAR/PF statute	√	√
20FH	Seal optional content	√	√
213H	Clear meter parameters	√	√

Energy :

Modbus address (HEX)	Parameter description	Communication	Key
900H-901H	Total Real Energy	√	--
902H-903H	Total Real Energy tariff 1	√	--
904H-905H	Total Real Energy tariff 2	√	--
906H-907H	Total Real Energy tariff 3	√	--

Modbus address (HEX)	Parameter description	Communication	Key
908H-909H	Total Real Energy tariff 4	√	--
90AH-90BH	Net Real Energy	√	--
90CH-90DH	Net Real Energy tariff 1	√	--
90EH-90FH	Net Real Energy tariff 2	√	--
910H-911H	Net Real Energy tariff 3	√	--
912H-913H	Net Real Energy tariff 4	√	--
914H-915H	Consumed Real Energy	√	--
916H-917H	Consumed Real Energy tariff 1	√	--
918H-919H	Consumed Real Energy tariff 2	√	--
91AH-91BH	Consumed Real Energy tariff 3	√	--
91CH-91DH	Consumed Real Energy tariff 4	√	--
91EH-91FH	Generated Real Energy	√	--
920H-921H	Generated Real Energy tariff 1	√	--
922H-923H	Generated Real Energy tariff 2	√	--
924H-925H	Generated Real Energy tariff 3	√	--
926H-927H	Generated Real 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	Consumed Reactive Energy	√	--
93EH-93FH	Consumed Reactive Energy tariff 1	√	--
940H-941H	Consumed Reactive Energy tariff 2	√	--
942H-943H	Consumed Reactive Energy tariff 3	√	--
944H-945H	Consumed Reactive Energy tariff 4	√	--
946H-947H	Generated Reactive Energy	√	--

Modbus address (HEX)	Parameter description	Communication	Key
948H-949H	Generated Reactive Energy tariff 1	√	--
94AH-94BH	Generated Reactive Energy tariff 2	√	--
94CH-94DH	Generated Reactive Energy tariff 3	√	--
94EH-94FH	Generated 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 seal is sealed, its ealed be changed when the meter's change difference between time and current operation time is within ±5 minutes.

Address	Parameter description	Communication	Key
TOU related parameters			
402H-40EH	TOU energy setting parameter 1	√	--
420H-5F3H	TOU 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.

The chapter's contents include MODBUS protocol, communication format, application details of AcuRev 1200 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", the unit 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 respon

2.1 Frame Format

Table 5-1 Data Frame Format

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

2.2 Address Field

The address field is at the start of the frame. It is composed of 1 byte (8 bits), its decimal value 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 field of 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 the slave what kind of action to perform.

Table 5-2 Function Code

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

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 and other interferences, a group of data may be changed while transmitting from one location to the another. 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 is applied 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 value is 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-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not 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, no action 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. When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

5.2 Communication Format

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 1200 series meters' total real energy addresses are 900H, 901H. Total real energy tariff 1 addresses are 902H, 903H. Total real energy tariff 2 address are 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 slave device address, function code, data quantity and CRC check.

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

Table 5-5 Response of Total Real Energy,Total Real Energy tariff 1,Total Real 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,TOU parameter, initialization energy.

Table 5-6 is an example of It's Total Real Energy is 0.20KWh,Total Real Energy tariff 1 is 0.12KWh,Total Real 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.

Table 5-8 Read the State of theRelay Response Data

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

The Data byte content

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

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

4. 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 is 0-65535.

"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 -21 47483648~21 47483647.

"float"is single precision floating point, using two register addresses.The data range is -0.0~3.402823E+38.

2. The relationship between communication value and real value

The meter's communication value does not always equal to the real value. There is a conversion relationship between them. It is very important to be aware of the parameter relationship when users design a communication software, otherwise the result may be incorrect.

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	The communication value equals the real value	Electrical measurement parameters' unit
Energy parameters	The communication value equals the real value/100	Energy parameters' unit

3. Parameter address table

Model 1,2,3,4 mean AcuRev 1201, AcuRev 1202, AcuRev 1203, AcuRev 1204.

Read only block 03H- read command.

Table 5-12 Meter Running State Display

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default value	Model	Register number
100H	Meter running state word1	Word	R	See table 5-13~5-16		1, 2 3, 4	1
101H	Meter running state word2	Word	R	See table 5-13~5-16		1, 2 3, 4	1
102H	Meter running state word3	Word	R	See table 5-13~5-16		1, 2 3, 4	1
103H	Meter running state word4	Word	R	See table 5-13~5-16		1, 2 3, 4	1
104H	Meter running state word5	Word	R	See table 5-13~5-16		1, 2 3, 4	1
105H	Meter running state word6	Word	R	See table 5-13~5-16		1, 2 3, 4	1
106H	Meter running state word7	Word	R	See table 5-13~5-16		1, 2 3, 4	1
107H	Seal state	Word	R	0x0A: Seal sealed Others: Seal open		1, 2 3, 4	1
108H-10FH	Reserved						

Meter running state word 1:

Table 5-13 Meter running state word 1

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved	Reserved	Reactive power direction 0: +;1:-	Real power direction 0: +;1:-	Battery power meter Reserved	Clock battery Reserved	Demand measurement 0: Slid 1: Block	Reserved
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Meter running state word 2:

Table 5-14 Meter running state word 2

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Meter running state word 3(operation) :

Table 5-15 Meter running state word 3

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved	Reserved	Reserved	Relay state 0:Close 1:Open	Programming available 0: Disable 1: Enable	Power supply mode Reserved		Reserved
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Meter running state word 4(A phase fault status):

Table 5-16 Meter running state word 4

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
Bit15	Bit14	Bit13	Bit12	Bit11	Bit10	Bit9	Bit8
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

System parameter district

System parameter decides the device's working mode.

10H- read command

03H- write command

Table 5-17 System Parameters address table

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default value	Model	Register number
200H	Meter address	Word	R/W	1-247	1	1,2,3,4	1
201H	Line-side choice	Word	R/W	0x00: On the side line; 0xAA: The lower side of the line	0	1,2,3,4	1
202H	Reserved						
203H	RS485 Communication baud rate	Word	R/W	1200 2400 4800 9600 19200 38400 Other invalid	19200	1, 2 3, 4	1
204H	RS485 Communication check	Word	R/W	0: Even 1: Odd 2: Non2 3: Non1	3	1, 2 3, 4	1
205H	Reserved						
206H	Reserved						
207H	Reserved						
208H	Reserved						
209H	Pulse option	Word	R/W	0:Real energy 1: Reactive energy	0	3, 4	1
20AH	Demand calculate way option	Word	R/W	0: Slid 1: Fixed 2: Roll 3: Thermal demand	0	3, 4	1
20BH	Demand calculate cycle	Word	R/W	1-30min	15	3, 4	1
20CH	Demand calculate slip time	Word	R/W	1-30min	1	3, 4	1

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default value	Model	Register number
20DH	Reactive power alculate way	Word	R/W	0: True reactive 1:Generalized reactive	0	3, 4	1
20EH	VAR/PF	Word	R/W	0: IEC 1: IEEE	0	3, 4	1
20FH	Seal option	Word	R/W	Bit0:TOU set 1:Enable 0:Disable	0	3, 4	1
210H	Current communicate permission authority	Word	R/W	0x02: Event clearance: Event clearance, write energy data 0x04: Write data: (except for energy data). Max of demand clearance. **Note**: The change of register should be sent with current password, and ensure the current password is correct. Writing other values is invalid.	0	1, 2 3, 4	1
211H	Current password	Word	W	Write data range: 0000-9999		1, 2 3, 4	1
212H	New password	Word	W	0000-9999		1, 2 3, 4	1

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default value	Model	Register number
213H	Clear meter's data	Word	W	Bit0:Clear demand data Bit1:Clear energy data Bit2:Clear program record Bit3:Clear open cover record Bit4:Clear demand event record Bit8: Clear meter data 0: Not clear 1:Clear		1, 2 3, 4	1
214H	Optional display flag 1			See table 5-23		1, 2 3, 4	1
215H	Optional display flag2			See table 5-23		2, 3, 4	1
216H-21FH	Reserved						

Table 5-18 display programming table

Screen	No.	Set flag	Content	Type 1	Type 2	Type 3	Type 4
1			Meter address	√	√	√	√
2			RS485 communication baud rate		√	√	√
3			RS485 communication check mode		√	√	√
4			Hardware version	√	√	√	√
5			Software version	√	√	√	√
6			Pubish date	√	√	√	√
7			Type specification	√	√	√	√
8			Total Real energy	√	√	√	√
9-12	1	Optional display flag word1 - Bit0	Total Real energy rate1-4			√	√

Screen	No.	Set flag	Content	Type 1	Type 2	Type 3	Type 4
13	2	Optional display flag word1 - Bit1	Net active energy	√	√	√	√
14-17	3	Optional display flag word1 - Bit2	Net active energy rate 1-4			√	√
18	4	Optional display flag word1 - Bit3	Consumed Rea energy	√	√	√	√
19-22	5	Optional display flag word1 - Bit4	Consumed Rea energy rate 1-4			√	√
23	6	Optional display flag word1 - Bit5	Generated Real energy	√	√	√	√
24-27	7	Optional display flag word1 - Bit6	Generated Real energy rate 1-4			√	√
28			Total reactive energy			√	√
29-32	8	Optional display flag word1 - Bit7	Total reactive energy rate 1-4			√	√
33	9	Optional display flag word1 - Bit8	Net reactive energy			√	√
34-37	10	Optional display flag word1 - Bit9	Net reactive energy rate 1-4			√	√
38	11	Optional display flag word1 - Bit10	Consumed reactive energy			√	√
39-42	12	Optional display flag word1 - Bit11	Consumed reactive energy rate 1-4			√	√
43	13	Optional display flag word1 - Bit12	Generated reactive energy			√	√
44-47	14	Optional display flag word1 - Bit13	Generated reactive energy rate 1-4			√	√
48	15	Optional display flag word1 - Bit14	Total apparent energy			√	√
49	16	Optional display flag word1 - Bit15	Voltage		√	√	√
50	17	Optional display flag word2 - Bit0	Current		√	√	√
51	18	Optional display flag word2 - Bit1	System Real energy		√	√	√

Screen	No.	Set flag	Content	Type 1	Type 2	Type 3	Type 4
52	19	Optional display flag word2 - Bit2	System reactive power			√	√
53	20	Optional display flag word2 - Bit3	System apparent power			√	√
54	21	Optional display flag word2 - Bit4	System power factor			√	√
55	22	Optional display flag word2 - Bit5	Frequency		√	√	√
56	23	Optional display flag word2 - Bit6	Real Power demand			√	√
57	24	Optional display flag word2 - Bit7	Reactive power demand			√	√
58	25	Optional display flag word2 - Bit8	Apparent power demand			√	√
59	26	Optional display flag word2 - Bit9	Current demand			√	√
60	27	Optional display flag word2 - Bit10	Current time			√	√
61	28	Optional display flag word2 - Bit11	Current time			√	√
62			End the screen	√	√	√	√

Clock (03H: read 10H: write)

Table 5-19 Clock Address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
300H	Clock: Year	Word	R/W	2000-2099	2000	3, 4	1
301H	Clock: Month	Word	R/W	1-12	1	3, 4	1
302H	Clock: Date	Word	R/W	1-31	1	3, 4	1
303H	Clock: Hour	Word	R/W	0-23	0	3, 4	1
304H	Clock:Minute	Word	R/W	0-59	0	3, 4	1

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
305H	Clock :Second	Word	R/W	0-59	0	3, 4	1
306H	Week	Word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	6	3, 4	1

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

Table 5-20 Daylight saving time address table

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
DST setting							
350H	DST enable	Word	R/W	1:Enable 0:Disable	0	3, 4	1
351H	Set format choose	Word	R/W	0: Format 1 1: Format 2	0	3, 4	1
Format 1							
352H	DST start month	Word	R/W	1~12	1	3, 4	1
353H	DST start date	Word	R/W	1~31	1	3, 4	1
354H	DST start hour	Word	R/W	0~23	0	3, 4	1
355H	DST start minute	Word	R/W	0~59	0	3, 4	1
356H	DST start adjust time(min)	Word	R/W	1~120	60	3, 4	1
357H	DST end month	Word	R/W	1~12	1	3, 4	1
358H	DST end date	Word	R/W	1~31	1	3, 4	1
359H	DST end hour	Word	R/W	0~23	0	3, 4	1
35AH	DST end minute	Word	R/W	0~59	0	3, 4	1
35BH	DST end adjust time(min)	Word	R/W	1~120	60	3, 4	1

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
Format 2							
35CH	DST start month	Word	R/W	1~12	1	3, 4	1
35DH	DST start week	Word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	0	3, 4	1
35EH	DST start which week	Word	R/W	1~5	1	3, 4	1
35FH	DST start hour	Word	R/W	0~23	0	3, 4	1
360H	DST start minute	Word	R/W	0~59	0	3, 4	1
361H	DST start adjust time(min)	Word	R/W	1~120	60	3, 4	1
362H	DST end month	Word	R/W	1~12	1	3, 4	1
363H	DST end week	Word	R/W	0~6 0: Sunday 1~6 Monday-Saturday	0	3, 4	1
364H	DST end which week	Word	R/W	1~5	1	3, 4	1
365H	DST end hour	Word	R/W	0~23	0	3, 4	1
366H	DST end minute	Word	R/W	0~59	0	3, 4	1
367H	DST end adjust time(min)	Word	R/W	1~120	60	3, 4	1

Time of use(TOU) energy

Table 5-21 TOU Energy Address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
400H	Error state number1			See table 5-27		3, 4	1
401H	Error state number1			See table 5-28		3, 4	1
402H	Year time district no.	Word	R/W	1-14	1	3, 4	1
403H	Date time segment table no.	Word	R/W	1-8	2	3, 4	1
404H	Date time segment no.	Word	R/W	1-14	2	3, 4	1
405H	Rate no.	Word	R/W	1-4	4	3, 4	1

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
406H	Weekend feature word	Word	R/W	Bit0-bit7weekday 0:Weekend	0	3, 4	1
407H	Weekend segment table no.	Word	R/W	1-8	1	3, 4	1
408H	Special date no.	Word	R/W	0-30	0	3, 4	1
409H	TOU energy month calculate date(default 1)	Word	R/W	1-28	1	3, 4	1
40AH	TOU energy month calculate hour(default 0)	Word	R/W	0-23	0	3, 4	1
40BH	TOU energy function enable	Word	R/W	0:Disable 1:Enable	0	3, 4	1
40CH	TOU energy rate source option	Word	R/W	0:Internal clock 1:Com command	0	3, 4	1
40DH	Current rate value	Word	R/W	1-4	1	3, 4	1
40EH	TOU energy time settingRestore factory settings enable	Word	W	Write 0x0A valid		3, 4	1
420H-422H	1 time zone start time		R/W		02-01 01	3, 4	3
423H-425H	2 time zone start time		R/W		06-01 02	3, 4	3
426H-428H	3 time zone start time		R/W		10-01 03	3, 4	3
429H-42BH	4 time zone start time		R/W		00-00 00	3, 4	3
42CH-42EH	5 time zone start time		R/W		00-00 00	3, 4	3
42FH-431H	6 time zone start time		R/W		00-00 00	3, 4	3
432H-434H	7 time zone start time		R/W		00-00 00	3, 4	3
435H-437H	8 time zone start time		R/W		00-00 00	3, 4	3
438H-43AH	9 time zone start time		R/W		00-00 00	3, 4	3
43BH-43DH	10 time zone start time		R/W		00-00 00	3, 4	3
43EH-440H	11 time zone start time		R/W		00-00 00	3, 4	3

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
441H-443H	12 time zone start time		R/W		00-00 00	3, 4	3
444H-446H	13 time zone start time		R/W		00-00 00	3, 4	3
447H-449H	14 time zone start time		R/W		00-00 00	3, 4	3
44AH-44CH	1st day 1st time seg start time and tariff number		R/W		07:12 01	3, 4	3
44DH-44FH	1st day 2nd time seg start time and tariff number		R/W		15:22 03	3, 4	3
450H-452H	1st day 3rd time seg start time and tariff number		R/W		00:00 00	3, 4	3
453H-455H	1st day 4th time seg start time and tariff number		R/W		00:00 00	3, 4	3
456H-458H	1st day 5th time seg start time and tariff number		R/W		00:00 00	3, 4	3
459H-45BH	1st day 6th time seg start time and tariff number		R/W		00:00 00	3, 4	3
45CH-45EH	1st day 7th time seg start time and tariff number		R/W		00:00 00	3, 4	3
45FH-461H	1st day 8th time seg start time and tariff number		R/W		00:00 00	3, 4	3
462H-464H	1st day 9th time segstart time and tariff number		R/W		00:00 00	3, 4	3

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
465H-467H	1st day 10th time seg start time and tariff number		R/W		00:00 00	3, 4	3
468H-46AH	1st day 11th time seg start time and tariff No		R/W		00:00 00	3, 4	3
46BH-46DH	1st day 12th time seg start time and tariff number		R/W		00:00 00	3, 4	3
46EH-470H	1st day 13th time seg start time and tariff number		R/W		00:00 00	3, 4	3
471H-473H	1st day14th time seg start time and tariff number		R/W		00:00 00	3, 4	3
474H-49DH	2nd day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42
49EH-4C7H	3rd day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42
4C8H-4F1H	4th day 1-14th time segstart time and tariff number		R/W		00:00:00	3, 4	42
4F2H-51BH	5th day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42
51CH-545H	6th day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42
546H-56FH	7th day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
570H-599H	8th day 1-14th time seg start time and tariff number		R/W		00:00:00	3, 4	42
59AH-59CH	1st special date and time seg		R/W		03-12 01	3, 4	3
59DH-59FH	2nd special date and time seg		R/W		09-10 02	3, 4	3
5A0H-5A2	3rd special date and time seg		R/W		05-02 03	3, 4	3
5A3H-5A5H	4th special date and time seg		R/W		00-00 00	3, 4	3
5A6H-5A7H	5th special date and time seg		R/W		00-00 00	3, 4	3
5A9H-5ABH	6th special date and time seg		R/W		00-00 00	3, 4	3
5ACH-5AEH	7th special date and time seg		R/W		00-00 00	3, 4	3
5AFH-5B1H	8th special date and time seg		R/W		00-00 00	3, 4	3
5B2H-5B4H	9th special date and time seg		R/W		00-00 00	3, 4	3
5B5H-5B7H	10st special date and time seg		R/W		00-00 00	3, 4	3
5B8H-5F3H	11-30st special date and time seg		R/W			3, 4	3*20

Rate parameter error information word 1(basic parameter)

Table 5-22 Tariff parameter error information word 1

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	1	1	1	1	1	1	1
Weekend Schedule Setting error	Holiday setting error	Holiday Number Exceeds	Season Setting error	Season Setting	Schedule Table Exceeds	Schedule Setting Error	Rate no. Tariff

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

Table 5-23 Tariff parameter error information word 2

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
1	1	1	1	1	1	1	1
Schedule 8 error	Schedule 7 error	Schedule 6 error	Schedule 5 error	Schedule4 error	Schedule 3 error	Schedule 2 error	Schedule 1 error

Electrical measurementparameter area (03H:read)

Table 5-24 Electrical measurementparameter address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
800H-801H	Freq_rms	Float	R	45.00~65.00		2, 3, 4	2
802H-803H	U_rms	Float	R	0~400.00		2, 3, 4	2
804H-805H	I_rms	Float	R	0~80.000		2, 3, 4	2
806H-807H	P_rms	Float	R	-79.9999~79.999		2, 3, 4	2
808H-809H	Q_rms	Float	R	-79.9999~79.999		3, 4	2
80aH-80bH	S_rms	Float	R	-79.9999~79.999		3, 4	2
80cH-80dH	PF_rms	Float	R	-1.000~1.000		3, 4	2
80eH-80fH	RLC_val	Float	R	67('C'), 76('L'), 82('R')		3, 4	2
810H-811H	P_dema	Float	R	-79.9999~79.999		3, 4	2
812H-813H	Q_dema	Float	R	-79.9999~79.999		3, 4	2
814H-815H	S_dema	Float	R	-79.9999~79.999		3, 4	2

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
816H-817H	I_dema	Float	R	0-80.000		3, 4	2
818H-81FH	Reserved						

Energy data (03H read; 10H write)

Table 5-25 Energy data address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
Current energy data							
900H-901H	Total Real Energy	Dword	R/W	0~+99999999		1,2, 3,4	2
902H-903H	Total Real Energy tariff 1	Dword	R/W	0~+99999999		3,4	2
904H-905H	Total Real Energy tariff 2	Dword	R/W	0~+99999999		3,4	2
906H-907H	Total Real Energy tariff 3	Dword	R/W	0~+99999999		3,4	2
908H-909H	Total Real Energy tariff 4	Dword	R/W	0~+99999999		3,4	2
90AH-90BH	Net Real Energy	Int32	R/W	-99999999~+99999999		1,2,3,4	2
90CH-90DH	Net Real Energy tariff 1	Int32	R/W	-99999999~+99999999		3,4	2
90EH-90FH	Net Real Energy tariff 2	Int32	R/W	-99999999~+99999999		3,4	2
910H-911H	Net Real Energy tariff 3	Int32	R/W	-99999999~+99999999		3,4	2
912H-913H	Net Real Energy tariff 4	Int32	R/W	-99999999~+99999999		3,4	2
914H-915H	Consumed Real Energy	Dword	R/W	0~+99999999		1,2,3,4	2
916H-917H	Consumed Real Energy tariff 1	Dword	R/W	0~+99999999		3,4	2
918H-919H	Consumed Real Energy tariff 2	Dword	R/W	0~+99999999		3,4	2
91AH-91BH	Consumed Real Energy tariff 3	Dword	R/W	0~+99999999		3,4	2
91CH-91DH	Consumed Real Energy tariff 4	Dword	R/W	0~+99999999		3,4	2
91EH-91FH	Generated Real Energy	Dword	R/W	0~+99999999		1,2,3,4	2
920H-921H	Generated Real Energy tariff 1	Dword	R/W	0~+99999999		3,4	2

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
922H-923H	Generated Real Energy tariff 2	Dword	R/W	0~+99999999		3,4	2
924H-925H	Generated Real Energy tariff 3	Dword	R/W	0~+99999999		3,4	2
926H-927H	Generated Real Energy tariff 4	Dword	R/W	0~+99999999		3,4	2
928H-929H	Total Reactive Energy	Dword	R/W	0~+99999999		3,4	2
92AH-92BH	Total Reactive Energy tariff 1	Dword	R/W	0~+99999999		3,4	2
92CH-92DH	Total Reactive Energy tariff 2	Dword	R/W	0~+99999999		3,4	2
92EH-92FH	Total Reactive Energy tariff 3	Dword	R/W	0~+99999999		3,4	2
930H-931H	Total Reactive Energy tariff 4	Dword	R/W	0~+99999999		3,4	2
932H-933H	Net Reactive Energy	Int32	R/W	-99999999~+99999999		3,4	2
934H-935H	Net Reactive Energy tariff 1	Int32	R/W	-99999999~+99999999		3,4	2
936H-937H	Net Reactive Energy tariff 2	Int32	R/W	-99999999~+99999999		3,4	2
938H-939H	Net Reactive Energy tariff 3	Int32	R/W	-99999999~+99999999		3,4	2
93AH-93BH	Net Reactive Energy tariff 4	Int32	R/W	-99999999~+99999999		3,4	2
93CH-93DH	Consumed Reactive Energy	Dword	R/W	0~+99999999		3,4	2
93EH-93FH	Consumed Reactive Energy tariff 1	Dword		0~+99999999		3,4	2
940H-941H	Consumed Reactive Energy tariff 2	Dword		0~+99999999		3,4	2
942H-943H	Consumed Reactive Energy tariff 3	Dword		0~+99999999		3,4	2
944H-945H	Consumed Reactive Energy tariff 4	Dword		0~+99999999		3,4	2

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
946H-947H	Generated Reactive Energy	Dword		0~+99999999		3,4	2
948H-949H	Generated Reactive Energy tariff 1	Dword		0~+99999999		3,4	2
94AH-94BH	Generated Reactive Energy tariff 2	Dword		0~+99999999		3,4	2
94CH-94DH	Generated Reactive Energy tariff 3	Dword		0~+99999999		3,4	2
94EH-94FH	Generated Reactive Energy tariff 4	Dword		0~+99999999		3,4	2
950H-951H	Apparent Energy	Dword		0~+99999999		3,4	2
The last settlement date's energy data							
A00H-A51H	Same to the current energy data's format		R			3,4	
.....							
The 2nd last settlement date's energy data							
B00H-B51H	Same to the current energy data's format		R			3,4	
Note 1: Net Real Energy, Net Reactive Energy are signed words, the value range is -999999.99~+999999.99 **Note 2**: Real value = communication value/100							

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

Table 5-26 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	Consumed Real power's total max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss (Second always be 0)		3,4	2 3

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
1605H-1606H 1607H-1609H	Consumed Real power Tariff 1 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
160AH-160BH 160CH-160EH	Consumed Real power Tariff 2 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
160FH-1600H 1611H-1613H	Consumed Real power Tariff 3 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1614H-1615H 1616H-1618H	Consumed Real power Tariff 4 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1619H-161AH 161BH-161DH	Generated Real power's total max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
161EH-161FH 1620H-1622H	Generated Real power Tariff 1 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1623H-1624H 1625H-1627H	Generated Real power Tariff 2 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1628H-1629H 162AH-162CH	Generated Real power Tariff 3 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
162DH-162EH 162FH-1631H	Generated Real power Tariff 4 max demand and occur time	Float Dword	R	Xx.xxxx kw YYMMDDhhmmss		3,4	2 3
1632H-1633H 1634H-1636H	Consumed reactive power's total max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1637H-1638H 1639H-163BH	Consumed reactive power rate 1 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
163CH-163DH 163EH-1640H	Consumed reactive power rate 2 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1641H-1642H 1643H-1645H	Consumed reactive power rate 3 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1646H-1647H 1648H-164AH	Consumed Real power Tariff 4 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
164BH-164CH 164DH-164FH	Generated reactive power's total max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1650H-1651H 1652H-1654H	Generated reactive power Tariff 1 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
1655H-1656H 1657H-1659H	Generated reactive power Tariff 2 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
165AH-165BH 165CH-165EH	Generated reactive power rTariff 3 max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
165FH-1660H 1661H-1663H	Generated reactive power Tariff 4 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	Current max demand and occur time	Float Dword	R	Xx.xxxx kvar YYMMDDhhmmss		3,4	2 3
166EH-1690H	Reserved						

Event logging (03H:read)

Programming record

Table 5-27 Programming record address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
1A00H-1A01H	Total programming time	Dword	R	0-999999		3, 4	2
Last time programming record							
1A02H-1A04H	Occur time	Word	R	YYMMDDhhmmss		3, 4	3
1A05H	Programming event flag	Word	R			3, 4	1
Last 2nd time –last 3rd time							
1A06H-1A0DH						3, 4	
Note : Programming event flag 01: Meter address programming event; 02: RS485 communication parameter programming event (including baud rate and check mode) 03: Reserved ; 04: Reserved; 05: Energy pulse source programming event; 06: Demand related programming event(calculate method, demand cycle, slid time); 07: Ractive calculate method programming event; 08: VAR/PF specification programming event; 09: Change time programming event; 10: Change energy base event; 11: TOU parameter setting programming event; 12:Change daylight saving time event; 13: Change trend record event.							

Demand clearance event

Table 5-28 Demand clearance address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
1B00H-1B01H	Total demand clearance time	Word	R	0-999999		3, 4	2

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
Last time demand clearance record							
1B02H-1B04H	Occur time	Word	R	YYMMDDhhmmss		3, 4	3
Last 2nd -3rd time							
1B05H-1B0AH						3, 4	

Open cover record

Table 5-29 Open cover record address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	
1C00H-1C01H	Total open cover time	Word	R	0-999999		3, 4	2
Last time open cover record							
1C02H-1C04H	Occur time	Word	R	YYMMDDhhmmss		3, 4	3
1C05H-1C07H	End time	Word	R			3, 4	3
Last 2nd -3rd time							
1C08H-1C13H						3, 4	

Event clearance

Table 5-30 Event clearance address

Modbus address(HEX)	Parameter description	Data type	R/W		Default	Model	Register number
1D00H-1D01H	Total event clearance time	Word	R			3, 4	2
Last time event clearance record							
1D02H-1D04H	Occur time	Word	R	YYMMDDhhmmss		3, 4	3

Modbus address(HEX)	Parameter description	Data type	R/W		Default	Model	Register number
1D05H	Event clearance data flag	Word	R	1: Clear the programming records 2: Clear demand records 3: Clear open cover records		3, 4	1
Last 2nd -3rd time							
1D06H-1D0DH						3, 4	

Meter clearance event

Table 5-31 Meter clearance address

Modbus address(HEX)	Parameter description	Data type	R/W	Data range	Default	Model	Register number
1E00H-1E01H	Total meter clearance time	Word	R	0-999999			2
Last time meter clearance record							
1E02H-1E04H	Occur time	Word	R	YYMMDDhhmmss		3, 4	3
Last 2nd -3rd time							
1E05H-1E0AH							

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

RO state read(01H)

Table 5-32 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 5-33 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		Parameter	AcuRev 1201	AcuRev 1202	AcuRev 1203	AcuRev 1204
Energy	Real Power	Ep_imp, Ep_exp	●	●	●	●
	Reactive Power	Eq_imp, Eq_exp			●	●
	Apparent Power	Es_imp, Es_exp			●	●
TOU	4 Tariffs				●	●
Power Demand	Power Demand	Dmd_P, Dmd_Q, Dmd_S			●	●
	Power Demand Max	Dmd_P_max, Dmd_Q_max, Dmd_S_max			●	●
Current Demand	Current Demand	Dmd I			●	●
	Current Demand Max	Dmd_I_max			●	●
Real–time Parameter	Phase Voltage or Line Voltage	V		●	●	●
	Current	I		●	●	●
	Real Power	P		●	●	●
	Reactive Power	Q			●	●
	Apparent Power	S			●	●
	Power Factor	PF			●	●
	Frequency	F		●	●	●
Clock	Year/month/Date/Hour/Minute/Second				●	●
Communication	Non-contact infrared		●	●	●	●
	RS485			●	●	●

● fixed function Blank: no this function

Appendix B Technical Data and Specification

Voltage	
Standard reference voltageVn	220 Vac l-N
Working voltage range	80%-120% Vn
Working frequency	50/60Hz

Current	
Standard reference current In	10(50)A , 20(80)A
Start current	0.001In

Power supply	
Supply voltage	From the voltage loop
Consumption	<2W or <10VA

Environment	
Working temperature	-25-70 ℃
Storage temperature	-40-85 ℃
Humidity	Average humidity 85%. 30Days 95% per year

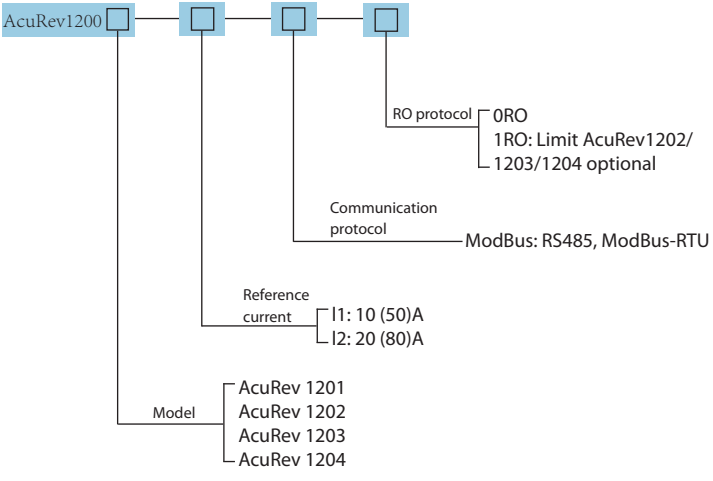
Pulse output	
Isolation voltage	2500Vac
External circuit voltage	5-60V
Max current	10mA
Pulse constant	200 imp/KWh
Pulse width (high voltage)	100ms

Communication	
RS485 interface rate	1200-38400bps
Communication protocol	Modbus-RTU
IR interface	Non- contact infrared
IR interface rate	1200bps

Measurement

Parameter	Accuracy	Resolution	Range
Real 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
Real power	0.5%	0.1W	-52-52kW
Reactive power	0.5%	0.1var	-52-52kvar
Apparent power	0.5%	0.1VA	-52-52kVA
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	-52-52kW -52-52kvar -52-52KVA
Current demand	0.5%	0.001A	80A

Appendix C Ordering Information



For example: AcuRev1203-A1-ModBus-1RO

Appendix D Revision History

Version	Date	Description
V2.01	20141021	First version
V2.02	20151211	Increase RO Function Description

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