



AcuRev 1310 DIN-Rail Power Meter User's Manual

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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.

Please read this manual carefully before installation, operation and maintenance of the AcuRev 1310 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.

Table of Contents

| | |
|---|-----------|
| Chapter 1: Introduction | 5 |
| 1.1 Meter Overview | 6 |
| 1.2 Areas of Application | 7 |
| 1.3 Product Features..... | 7 |
| Chapter 2: Installation | 9 |
| 2.1 Appearance and Dimensions..... | 11 |
| 2.2 Installation Methods | 12 |
| 2.3 Wiring..... | 13 |
| 2.3.1 Terminals:..... | 15 |
| 2.3.2 Auxiliary Power Supply:..... | 15 |
| 2.3.3 Voltage Input:..... | 16 |
| 2.3.4 Current Input:..... | 17 |
| 2.3.5 Relay Output Wiring Diagram | 24 |
| 2.3.6 Communication | 25 |
| Chapter 3: Operation and Application | 26 |
| 3.1 Display Panel and Keys..... | 27 |
| 3.2 Display Mode and Key Operations..... | 28 |
| 3.2.1 Important parameter display mode:..... | 28 |
| 3.2.2 All parameter display mode: | 28 |
| 3.2 Parameter Display and Key Operations | 29 |
| 3.4 Settings and Operations:..... | 32 |
| 3.4.1 Settings Mode..... | 32 |
| 3.5 Meter Configuration | 35 |
| 3.5.1 Initial Setup | 35 |
| Chapter 4 Functions Functions and Software | 39 |
| 4.1 Introduction to AcuRev 1310 Utility Software | 40 |
| 4.2 Parameter Settings..... | 42 |
| 4.2.1 Wiring Method & CT/PT Settings | 42 |
| 4.2.2 Reactive Power Calculation:..... | 43 |
| 4.2.3 Modbus Communication Options:..... | 43 |
| 4.2.4 Energy Pulse Output | 44 |
| 4.2.5 Demand | 45 |

| | |
|---|------------|
| 4.2.6 Sealing Option..... | 46 |
| 4.2.7 Communication Permission | 47 |
| 4.2.8 Display Parameters | 48 |
| 4.2.9 Energy Decimal Places & RO output mode:..... | 49 |
| 4.3 Real-time Metering..... | 49 |
| 4.4 Measurement Function | 51 |
| Figure 4-20 Weekend Setting in TOU configurations page..... | 53 |
| 4.4.1 TOU Seasons | 53 |
| 4.4.2 Daylight Saving Time (DST) | 55 |
| 4.5 Event Logging | 56 |
| 4.6 Alarm Function..... | 58 |
| 4.6.1 Configuring the Alarm..... | 60 |
| 4.6.2 Reading the Alarm..... | 60 |
| 4.7 Incorrect Connection Detection | 61 |
| 4.8 Sealing Function | 62 |
| 4.9 Device Information..... | 65 |
| Chapter 5: Communication..... | 66 |
| 5.1 Modbus Protocol Information | 67 |
| 5.1.1. Transmission Mode | 67 |
| 5.1.2. Frame | 67 |
| 5.2 Communication Format | 68 |
| 5.3 Application Details | 70 |
| 5.3.1 Data Types | 70 |
| 5.3.2 Relationship between Communication value and Real value | 70 |
| 5.3.3 Parameter Address Table..... | 71 |
| Appendix | 102 |
| Appendix A – Functions List | 103 |
| Appendix B Technical Specifications and Parameters | 104 |
| Appendix C Revision History | 105 |
| Appendix D Alarm Parameters Comparison Table | 105 |
| Appendix E Meter Event Flags: bit32 | 106 |

Welcome to the AcuRev 1310!

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 1310 features and application areas.

Chapter 2 introduces the AcuRev 1310 installation and wiring methods in detail.

Chapter 3 walks through how to operate the AcuRev 1310 via the display panel, display measurement data and parameter settings.

Chapter 4 introduces main functions with the included software.

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

Appendix provides AcuRev 1310 technical specifications and ordering information.

AcuRev 1310 DIN-Rail Power Meter

Chapter 1: Introduction

1.1 Meter Overview

1.2 Areas of Application

1.3 Product Features



1.1 Meter Overview

The AcuRev 1310 series is a DIN rail-mounted, three phase energy meter that is small in size with high accuracy. The meter is equipped with an easy to read liquid crystal display (LCD) which conveys all the important data. It is ideal for building energy management systems, energy monitoring and energy metering systems.

Energy

The AcuRev 1310 series supports bi-directional active energy measurements, as well as two-way reactive power energy metering, and four quadrant reactive power energy metering. It also supports apparent energy metering, the cumulative energy metering (Energy Import + Energy Export), and net energy metering (input power - output power).

Measurement Function

The AcuRev 1310 series meters provides real-time RMS measurement of the instantaneous Voltage, Current, Power, Frequency and Power Factor. All measurements can be viewed through the meter display as well as the AcuRev 1310 Utility Software.

Demand

This product provides demand measurement of Current, Active Power, Reactive Power and Apparent Power. It also provides demand forecasting as well as the peak demand.

System Event Logging

The AcuRev 1310 series meter can record the time and event regarding important parameter events.

- **Run time of meter**
Supports meter running time of measurements and events.
- **Alarm function**
Supports multiple parameter alarms, and can be configured to trigger Relay Output.

Communication

This meter supports Modbus RTU communication over RS485, as well as an infrared interface. It can also communicate with a computer over RS-485, Ethernet, and USB.

1.2 Areas of Application

Large Commercial Center
School
Hotels and Buildings
Smart Building System
Industrial Environment

Rail Transport
Public Facilities
Smart Distribution Cabinet
Energy Management System
Energy Saving System

1.3 Product Features

Multifunction, high accuracy

AcuRev 1310 series meter has data collection and management for energy and multi-parameters measurement. It also features demand measurement and event logging.

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

Small size, convenient installation

The appearance and dimension of the AcuRev 1310 series meter is designed in accordance with the IEC 35mm DIN standard.

Clear Display

The AcuRev 1310 series features a clear display to provide visibility in all environments. All measurement parameters can be found and easily accessed through the display. The LCD display has backlight support that can aid users in weak lighting environments.

Safety

AcuRev 1310 series product has both an electronic and physical sealing function. It is designed in such a way that it cannot be opened without leaving signs of tampering. Users cannot change the parameters through the display when the electronic sealing is closed, and important parameters cannot be changed through communication, thus preventing data or configurations from being altered.

Convenient wiring

It supports both high voltage systems and low voltage systems, as well as both three-phase three-wire systems and three-phase four-wire systems. Users can choose the appropriate wiring configuration for the AcuRev 1310 series meter. The AcuRev 1310 series meter can be used for single phase systems as well.

Wiring Check

The AcuRev 1310 series meter has a connection error feature that helps to reduce wiring errors.

AcuRev 1310 DIN-Rail Power Meter

Chapter 2: Installation

2.1 Appearance and Dimensions

2.2 Installation Methods

2.3 Wiring



Before Installation

The installation must be performed by qualified, competent accredited professionals who has received formal training and has experience with high voltage and current devices. Appropriate safety wear (gloves, glasses, arc flash 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/Potential Transformer leads 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 installation.
 - ✓ Do not supply input voltage above the rated maximum limit of the power meter and devices connected to it. Before energizing the meter, please refer to the meters label and specifications.
 - ✓ Do not perform high voltage test or insulation experiments to output, input or communication terminals.
 - ✓ The use of shorting blocks and fuses are recommended. Current transformers need to be grounded (5A/1A).
 - ✓ Use dry cloth to wipe the meter.

This chapter mainly describes the installation process of the AcuRev 1310 series meter, which is a very important step in using the meter correctly. This chapter provides information and diagrams about how to install the meter. Before installing the meter, please read through this section first.

2.1 Appearance and Dimensions



Figure 2-1 AcuRev 1310 Front Display

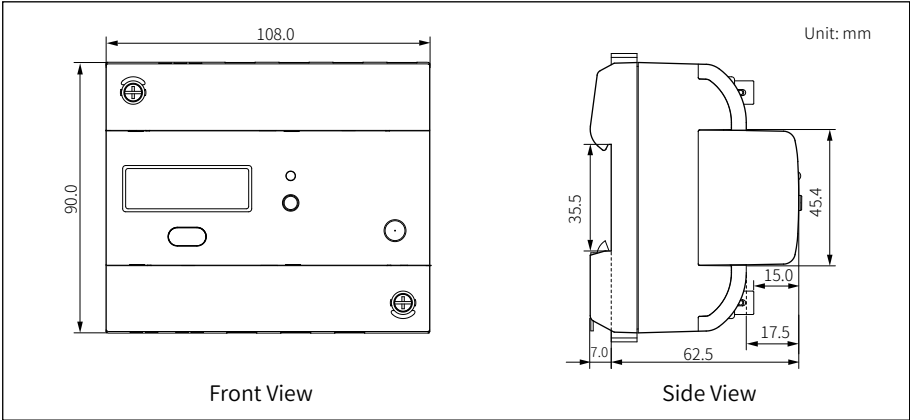



Figure 2-2 AcuRev 1310 meter Front and Side Dimensions

2.2 Installation Methods

Environmental

Before installation, please check the environment, temperature, and humidity to ensure the AcuRev 1310 series meter is being placed in an environment that are within temperature and humidity specifications.

 **Note**
Temperature and humidity of the environment must accord with the requirement of AcuRev 1310, Otherwise it may cause the meter damaged.

Temperature

AcuRev 1310 operating temperature is -25 ~ 75° C. Exceeding this temperature range will cause damage to the meter and will affect the accuracy and functionality. Please note this can influence the meters life negatively if the meter operates in extremely high or extremely low temperatures. AcuRev 1310 storage temperature range is 40~85° C.

Humidity

5% to 95% non-condensing.

Location

AcuRev 1310 series meter should be installed in a dry and dust free environment. Avoid exposing the meter to excessive heat, radiation and high electrical noise sources.

Installation Steps:

This product is DIN railed mounted and fits on a 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.

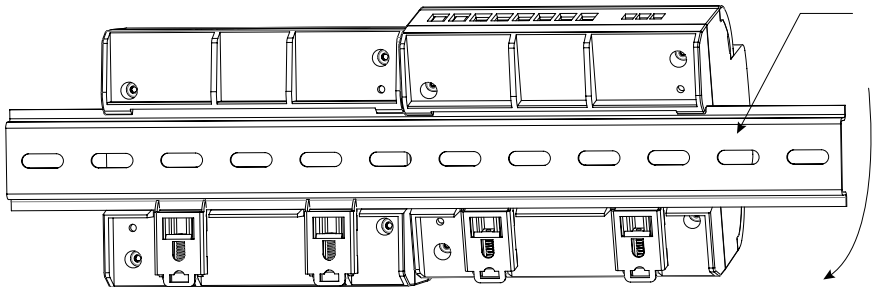


Figure 2-3 Step A

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

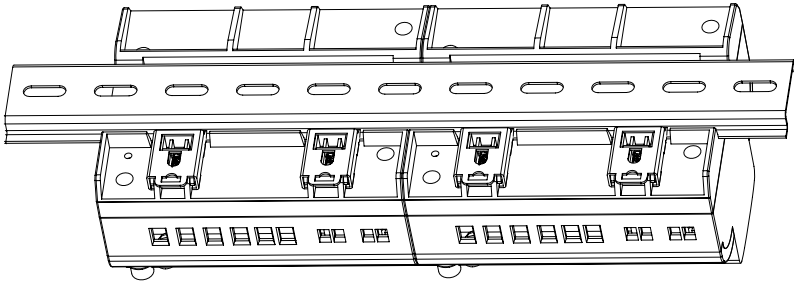


Figure 2-4 Step B

2.3 Wiring

The terminals of the AcuRev 1310 series can be accessed by first removing the terminal covers on the meter.

1. To open the terminal cover, remove the seal if applicable, and then unscrew the sealing screws and lift the cover upwards to remove.

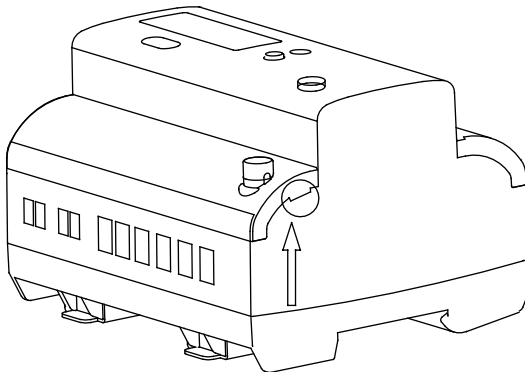


Figure 2-5 Removing terminal cover

2. To attach the bottom terminal cover back onto the meter, place the left side of the cover down into the groove first and then press down onto the right side, see Figure 2-6. When installed correctly, you will hear a clicking sound. To attach the top cover place the right side of the cover down into the groove and press down onto the left side.

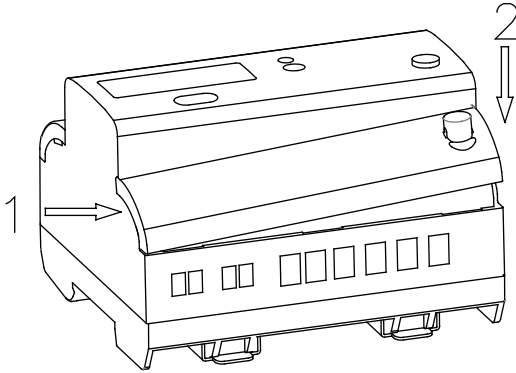


Figure 2-6 Attaching terminal cover onto meter

3. 3. After inserting the cover, tighten the sealing screws and place the seal.

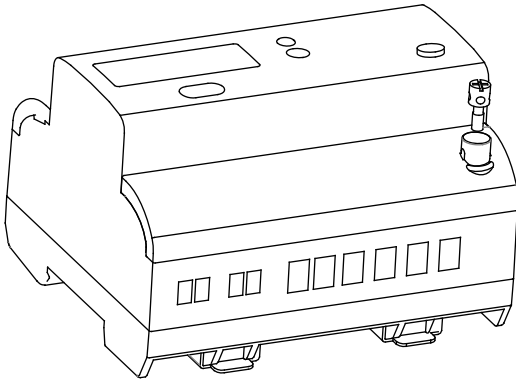


Figure 2-7

2.3.1 Terminals:

This manual uses V1, V2, V3 to represent three-phase conductors, which would be the same as Va, Vb, Vc in other manuals.

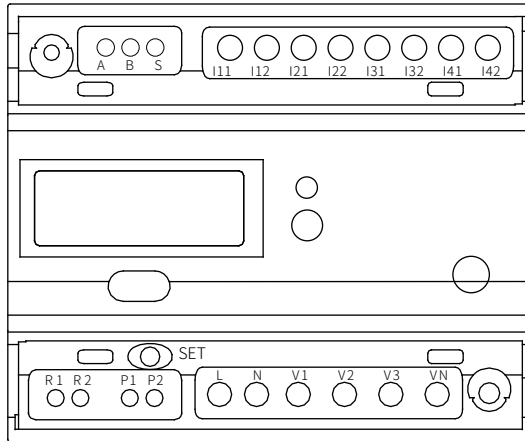


Figure 2-8 AcuRev 1310 Series Terminals

- Communications Terminal: A, B, S
- Pulse Output: P1, P2
- Auxiliary Power: L, N
- Voltage Inputs: V1, V2, V3, VN
- Current Inputs: I11, I12, I21, I22, I31, I32, I41, I42
- Relay Output: R1, R2

2.3.2 Auxiliary Power Supply:

The AcuRev 1310 series meter requires a power supply of 100 ~ 415 Vac at 50/60 Hz. For use of other power supply voltage selections please contact the manufacturer. The meter typically has small power consumption (less than 1W) so the power supply can be an independent power supply, or can also be obtained from the circuit under test.

It is suggested that under the condition that the power voltage fluctuation is large, to use a voltage stabilizer. The power supply terminals respectively are: L, N.

The typical auxiliary power wiring is as follows:

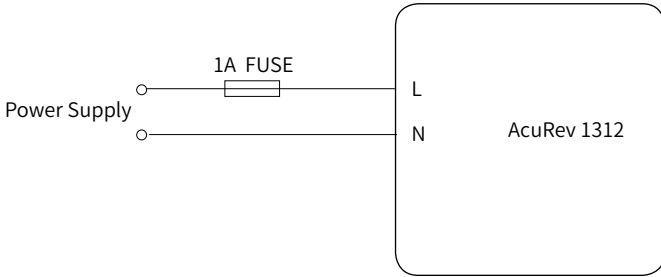


Figure 2-9 Power Supply Connections for Acurev 1310

The meter requires AWG22-16 as the wires to connect the power supply.

A fuse (typical 1A/250Vac) is suggested to be used when connecting the power supply to the meter.

Note: Check the power supply rating before wiring. Please confirm by reading the Power Supply information on the silver sticker at the side of the meter.

2.3.3 Voltage Input:

The maximum input voltage for the AcuRev 1310 series meter cannot exceed 400LN/690LL VAC RMS for three phase or 400LN VAC rms for single phase. The voltage input requires a 1A fuse.

Potential Transformer (PT) must be used for high voltage systems that are greater than the meters rated voltage. The rated secondary output from the PT is typically 100-120V. Please make sure to select an appropriate PT to maintain the measurement accuracy of the AcuRev 1310 series meter. When connecting using the WYE configuration wiring method, the PT's rated input or 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 being used. When connecting using the Delta configuration wiring method, the PT's rated input or primary side rated voltage should be equal to or close to the line voltage of the system.

A fuse rated for 1A/600V should be used when connecting the voltage inputs to the meter.

The meter requires the wire size to be AWG22-14.

Note: Under no circumstances 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.

2.3.4 Current Input:

Current Transformers (CTs) are required in most applications. The AcuRev 1310 series meter supports four CT input types, 5A/1A, 333mV, Rogowski coil (RCT) and mA (80/100/200). CTs must be used if the systems rated current is over 5A. The CT should be selected to maintain revenue grade accuracy of the system. The distance between CT and the meter should be as short as possible as the length of the CT leads will have an effect on the accuracy.

The meter requires AWG22-14 as the wire size to the current input terminals.

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 when 5A/1A output CTs.*

When using mV, RCT and mA CT's the secondary leads must not be grounded.

Vn Connection

Vn is the reference point of the AcuRev 1310 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.

AcuRev 1310 series meter supports different wiring configurations for both three phase and single phase systems. Please read this section carefully before choosing the suitable wiring method for your power system.

In the AcuRev 1310 series meter please make sure that the wiring connection mode and the corresponding practical application in engineering are correct to ensure the measurement accuracy of meter. Here are some of the common installation methods, their respective diagrams and meter configurations for the AcuRev 1310 series meter.

- 1) Three Phase: 4 wire-connection: (Three Phase with a neutral)
 Wiring mode 3LN. Three CT's needed for this connection.
 Common voltages for this connection: 120V LN/208V LL, 240V LN/415V LL

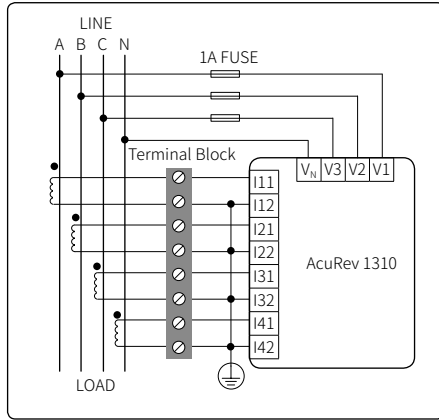


Figure 2-10a – AcuRev 1314 3LN wiring diagram using 5A/1A CTs

Note: AcuRev 1314-RCT current input does not support neutral current measurement

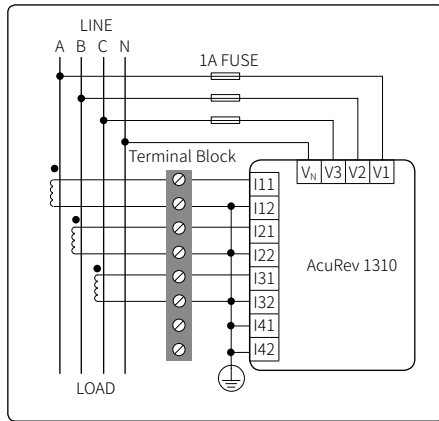


Figure 2-10b – **Acurev 1311, 1312, 1313** 3LN wiring diagram using 5A/1A CTs

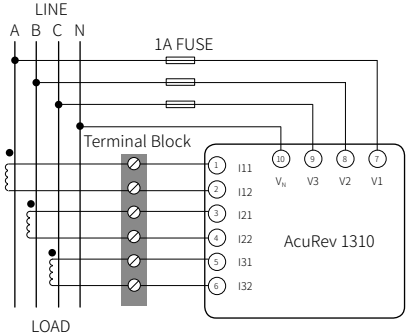


Figure 2-10c 3LN using 333mV, mA and Rogowski Coil CTs

2) Three Phase: 3 wire-connection (Three phase without a neutral)

The wiring mode is set to 2LL. Two CT's needed for this connection.

Note: Output of the CT is 5A/1A and mA.

With Potential Transformers (PTs) - PTs are required if the system voltage is higher than 690V LL. Instead of connecting the voltage lines directly to the meter, the voltage lines are connected to the meter using PTs. The PTs should be connected as shown below.

Note: Only two PTs are needed for this connection

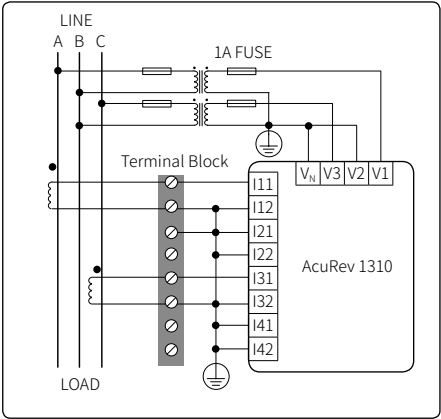


Figure 2-11a 2LL wiring diagram using 5A/1A CTs and PTs

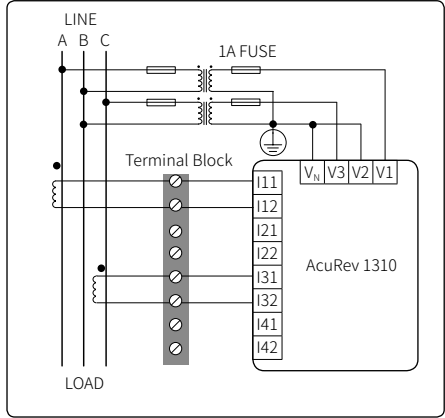


Figure 2-11b 2LL using 333mV, mA and Rogowski Coil CTs

Direct Connection, without PT's:

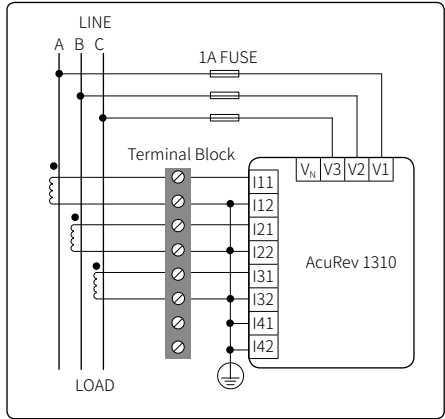


Figure 2-11c – 3LN– 3 phase delta no neutral wiring diagram using 5A/1A CTs

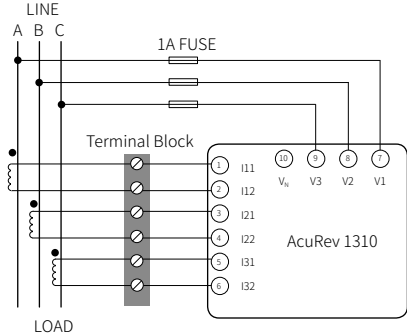


Figure 2-11d – 3LN- 3 phase no neutral wiring diagram using 333mV, mA and Rogowski Coil CTs.

3) Single Phase: 3 Lines (Single phase with 2 lines and a neutral)
The wiring mode is set to 1LL. Two CT's needed for this connection.

Common Voltage: 120V LN/240V LL

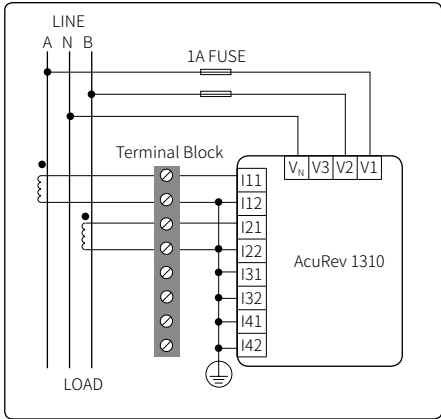


Figure 2-12a 1LL wiring diagram using 5A/1A and CT's

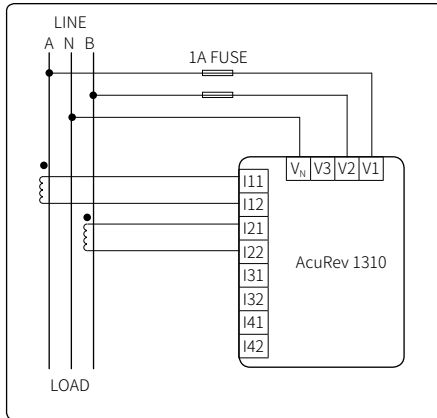


Figure2-12b 1LL Using 333mV, mA and Rogowski Coil CTs

4) Single Phase: 2 Lines (Single phase with one line and a neutral)
 The wiring mode is set to 1LN. One CT needed for this connection.

Common Voltage for this connection: 120V

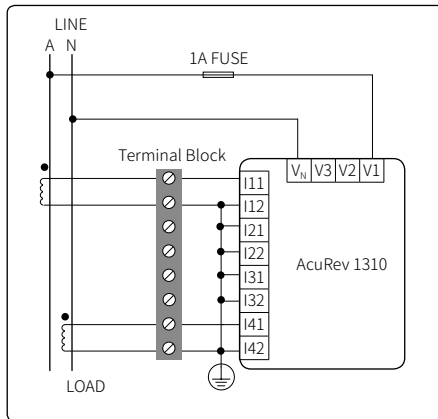


Figure 2-13a - **AcuRev 1314** Model 1LN using 5A/1A CT

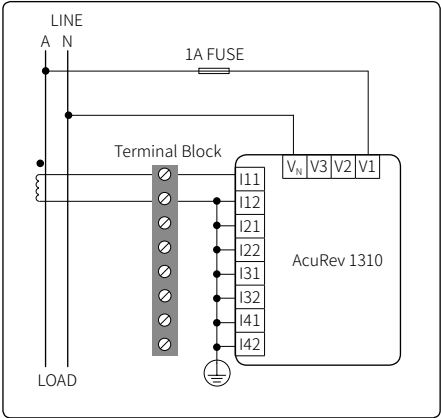


Figure 2-13b – **AcuRev 1311, 1312, 1313** Model 1LN using 5A/1A CT

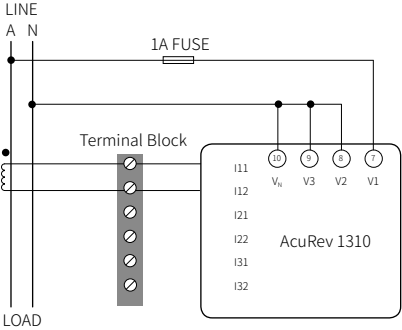


Figure 2-13c 1LN using 333mV, mA and Rogowski Coil CT

2.3.5 Relay Output Wiring Diagram

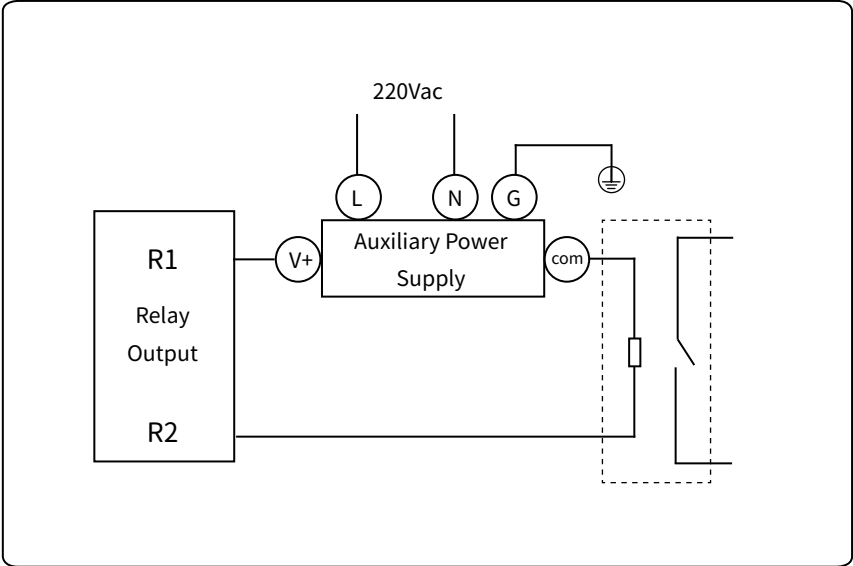


Figure 2-14 Relay Output Wiring Diagram

2.3.6 Communication

The AcuRev 1310 supports Modbus-RTU protocol through its built-in RS485 port. The RS485 terminals are denoted as 'A', 'B' and 'S'. 'A' is the positive differential terminal, 'B' is the negative differential terminal and 'S' is for connecting the shield of the shielded twisted pair cable.

The maximum distance of the cable should not exceed 1200m. This distance should be shorter if more devices are connected to the same communication link or if using a higher baud rate.

If the master device does not have a RS485 port but a RS232 port then a RS232-RS485 converter should be utilized.

In order to improve communication quality, use the following:

- A High-quality Shielded Twisted Pair cable is very important, AWG22 (0.6mm²) or lower is recommended.
- Pay attention to "single point earthing". This means that there is only one side for the shield to be connected to the ground in a communication link.
- Every A (+) should be connected to A (+), B (-) to B (-), or it will influence the network, even damage the communication interface.
- "T" type connection topology should be avoided. This means no new branches except from the starting point.
- Keep communication cables away as far as possible from sources of electrical noise. When several devices are connected in daisy chain to the same long communication line, a resistor (typical value 120- 300 Ohm, 0.25W) should be used at the end of the circuit (the last device of the chain).
- Use RS232/RS485 or USB/RS485 converter with optical isolated output and surge protection.

Chapter 3: Operation and Application

3.1 Display Panel and Keys

3.2 Display Mode and Key Operations

3.3 Parameter Display and Key Operations

3.4 Settings and Operations

3.5 Meter Configuration

3.6 Energy Pulse Output

In this chapter, users will be introduced to the interface of the AcuRev 1310 meter as well as how to interact with the meter using the key on the display to read and configure parameters.

3.1 Display Panel and Keys

The AcuRev 1310 meter consists of a built-in LCD screen and a key (SCROLL key) for users to interact with the meter. Figure 3.1.1 shows the display of the AcuRev 1310 with all characters and number segments visible as a visual example only, they would not appear on one page. These symbols are explained in Table 3.1.

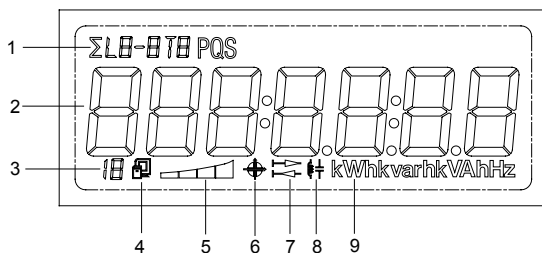








Figure 3.1.1

Table 1- Display icons

| 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 segments can be displayed. | To display the main measurement parameters: Energy, Voltage, Current, Power, Frequency, Demand, Settings, Time. |
| 3 |  | Indicates 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  | Displays in the analog way according to the load frequency |
| 6 | Four- quadrant reactive power display  | Indicates the first to fourth quadrant reactive power. |
| 7 |  | Import icon(right arrow): Displays the energy consumed Export icon(left arrow) displays the energy generated |
| 8 | Load type  | Inductance icon: Inductive load Capacitor icon: Capacitive load |
| 9 | unit | Unit of the parameter being displayed. |

3.2 Display Mode and Key Operations

The LCD display of the AcuRev 1310 meter consists of three display modes:

- Important Parameter Display
- All Parameters Display
- Settings mode.


By default, the important parameter display shows the Consumed Active Energy (kWh) parameter.

3.2.1 Important parameter display mode:

The important parameter display mode is the default display mode of the meter. It will display the measurement parameters of the AcuRev 1310 series meter. Users only see the Consumed Active Energy (kWh) parameter unless additional parameters are added through the settings mode.

Users will be in this mode when they power on the meter or when they push the "SCROLL" key after a period of inactivity. Each measurement parameter in this mode will display on the screen for 6 seconds. When the "SCROLL" key is pressed in this display mode it will lock the current page for a minute and the backlight will remain on. Pressing the "SCROLL" key again will turn the next page and lock the display for another minute. After one minute of inactivity the display will continue operating normally by cycling through the enabled measurement parameters.

3.2.2 All parameter display mode:

The all parameters display will show all the parameters that the AcuRev 1310 meter supports as well as information about the meter. Pressing and holding the "SCROLL" key from the important parameter display mode will direct the user to the all parameter display mode. In this mode there will be a  displayed on the bottom row of the display to indicate the AcuRev 1310 is in all parameters display mode.

Pressing the "SCROLL" key will turn to the next page in the display. Once the user has cycled through all the parameters, pressing the "SCROLL" key again will take the user back to the first page.

3.2 Parameter Display and Key Operations

The following tables show the All Parameters Display for the different AcuRev 1310 Series Meters.

Table 3-2 All Parameters Display for **AcuRev 1311**

| Page | Parameter |
|------|-------------------------------------|
| 1 | Voltage Wiring Check |
| 2 | Current Wiring Check |
| 3 | Meter Address |
| 4 | Hardware Version |
| 5 | Software Version |
| 6 | Date of Issue |
| 7 | Model Number |
| 8 | Imported Active Energy |
| 9 | Consumed Active Energy Phase A(kWh) |
| 10 | Consumed Active Energy Phase B(kWh) |
| 11 | Consumed Active Energy Phase C(kWh) |
| 12 | Voltage Phase A(V) |
| 13 | Voltage Phase B(V) |
| 14 | Voltage Phase C(V) |
| 15 | Current Phase A(A) |
| 16 | Current Phase B(A) |
| 17 | Current Phase C(A) |
| 18 | Total Current(A) |
| 19 | Total System Active Power |
| 20 | Active Power Phase A(kW) |
| 21 | Active Power Phase B(kW) |
| 22 | Active Power Phase C(kW) |
| 23 | Frequency(Hz) |
| 24 | Temperature |
| 25 | Meter Run Time |
| 26 | Load Run Time |
| --- | End |

Table 3-3 All Parameters Display for **AcuRev 1312**

| Page | Parameter |
|------|--------------------------------------|
| 1 | Voltage Wiring Check |
| 2 | Current Wiring Check |
| 3 | Device Address |
| 4 | Baud Rate |
| 5 | Parity |
| 6 | Hardware Version |
| 7 | Software Version |
| 8 | Release Date |
| 9 | Model |
| 10 | Consumed Active Energy(kWh) |
| 11 | Consumed Active Energy Phase A(kWh) |
| 12 | Consumed Active Energy Phase B(kWh) |
| 13 | Consumed Active Energy Phase C (kWh) |
| 14 | Phase A Voltage(V) |
| 15 | Phase B Voltage(V) |
| 16 | Phase C Voltage(V) |
| 17 | Phase A Current(A) |
| 18 | Phase B Current(A) |
| 19 | Phase C Current(A) |
| 20 | Total Current(A) |
| 21 | System Active Power(kW) |
| 22 | Active Power Phase A(kW) |
| 23 | Active Power Phase B(kW) |
| 24 | Active Power Phase C(kW) |
| 25 | Frequency(Hz) |
| 26 | Temperature |
| 27 | Meter run time |
| 28 | Load run time |
| --- | End |

Table 3-4 All Parameters Display for **AcuRev 1313**

| Page | Parameter |
|------|--------------------------------------|
| 1 | Voltage Wiring Check |
| 2 | Current Wiring Check |
| 3 | Device Address |
| 4 | Baud Rate |
| 5 | Parity |
| 6 | Hardware Version |
| 7 | Software Version |
| 8 | Release Date |
| 9 | Model |
| 10 | Consumed Active Energy(kWh) |
| 11 | Consumed Active Energy Phase A(kWh) |
| 12 | Consumed Active Energy Phase B(kWh) |
| 13 | Consumed Active Energy Phase C (kWh) |
| 14 | Phase A Voltage(V) |
| 15 | Phase B Voltage(V) |
| 16 | Phase C Voltage(V) |
| 17 | Phase A Current(A) |
| 18 | Phase B Current(A) |
| 19 | Phase C Current(A) |
| 20 | Total Current(A) |
| 21 | System Active Power(kW) |
| 22 | Active Power Phase A(kW) |
| 23 | Active Power Phase B(kW) |
| 24 | Active Power Phase C (kW) |
| 25 | Frequency(Hz) |
| 26 | Temperature |
| 27 | Meter run time |
| 28 | Load run time |
| --- | End |

Table 3-5 All Parameters Display for **AcuRev 1314**

| Page | Parameter |
|------|--------------------------------------|
| 1 | Voltage Wiring Check |
| 2 | Current Wiring Check |
| 3 | Device Address |
| 4 | Baud Rate |
| 5 | Parity |
| 6 | Hardware Version |
| 7 | Software Version |
| 8 | Release Date |
| 9 | Model |
| 10 | Consumed Active Energy(kWh) |
| 11 | Consumed Active Energy Phase A(kWh) |
| 12 | Consumed Active Energy Phase B(kWh) |
| 13 | Consumed Active Energy Phase C (kWh) |
| 14 | Phase A Voltage(V) |
| 15 | Phase B Voltage(V) |
| 16 | Phase C Voltage(V) |
| 17 | Phase A Current(A) |
| 18 | Phase B Current(A) |
| 19 | Phase C Current(A) |
| 20 | Total Current(A) |
| 21 | System Active Power(kW) |
| 22 | Active Power Phase A(kW) |
| 23 | Active Power Phase B(kW) |
| 24 | Active Power Phase C(kW) |
| 25 | Frequency(Hz) |
| 26 | Temperature |
| 27 | Meter run time |
| 28 | Load run time |
| --- | End |

3.4 Settings and Operations:

3.4.1 Settings Mode

The settings mode is where the user can perform most configurations for the AcuRev 1310 meter. To enter the settings press the “SET” key which is located under the meters terminal cover. Next the user will be prompted by a password screen.

To input the user password, users will use the “SCROLL” key to change the value of the flashing digit. The “SET” key is used to move between digits and to confirm the entered password when on the last digit.

After entering the correct password, the AcuRev 1310 will direct users to the device address configuration of the meter.

Note: Users will be redirected back to the important parameters screen after entering the password if the physical/electronic seal is enabled.

In the setting mode there will be an “S” in the top row followed by the setting page number. After a minute of inactivity in this mode, the meter will be redirected back to the important parameter display. If the “SCROLL” key is pressed and held, the meter will also be redirected out of the settings mode.

Note: The default password of the meter is 0000.

Note: The ‘SET’ key is located under the meters terminal cover.

In the settings mode, the following operations apply for the keys:

The “SET” key is used to enter edit mode of the setting and to confirm the setting change.

The “SCROLL” key is used to move to the next setting page and to change the value of the setting when in edit mode.

The following tables will show the Setting Display for the different AcuRev 1310 Series Meters.

Table 3-6 Setting Display for **AcuRev 1311**

| Page | Parameter | Range |
|------|--------------------------|---|
| 1 | Device Address | 1-247 |
| 2 | Password | 0000-9999 |
| 3 | Real Time Metering Mode | 1: Primary 2: Secondary |
| 4 | Voltage Wiring | 3LN; 1LL; 1LN; 2LL |
| 5 | CT2 | 5A/1A(5A Current Input) 80mA/100mA/200mA(mA Current Input) 333mV RCT |
| 6 | CT1 | 1~50,000 |
| 7 | PT2 | 50~400 |
| 8 | PT1 | 50~1000000 |
| 9 | Pulse Constant | 1~60000 |
| 10 | Pulse Width | 20~100ms |
| 11 | Energy Decimal Places | 0-3 |
| 12 | Custom Data Display: Add | |

| Page | Parameter | Range |
|------|-----------------------------|---------|
| 13 | Custom Data Display: Remove | |
| 14 | Wiring Check | On; Off |

Table 3-7 Setting Display for **AcuRev 1312**

| Page | Parameter | Range |
|------|-----------------------------|---|
| 1 | Device Address | 1-247 |
| 2 | Baud Rate | 1200;2400;4800;9600;19200;38400 |
| 3 | Parity | Even, Odd, None2, None1 |
| 4 | Energy Pulse Output | P: Real Energy; Q:Reactive Energy |
| 5 | Reactive Power Calculation | 0:True; 1:Generalized |
| 6 | Password | 0000-9999 |
| 7 | Real-time reading mode | 1: Primary; 2: Secondary |
| 8 | Wiring configuration | 3LN; 1LN; 1LL;2LL |
| 9 | CT2 | 5A/1A(5A Current Input) 80mA/100mA/200mA(mA Current Input) |
| 10 | CT1 | 1~50,000 |
| 11 | PT2 | 50~400 |
| 12 | PT1 | 50~1000000 |
| 13 | Pulse Constant | 1~60000 |
| 14 | Pulse Width | 20~100ms |
| 15 | Energy Decimal places | 0-3 |
| 16 | Custom data display: Add | |
| 17 | Custom data display: Remove | |
| 18 | Wiring check enable | On; Off |

Table 3-8 Setting Display for **AcuRev 1313**

| Page | Parameter | Range |
|------|----------------------------|---|
| 1 | Device Address | 1-247 |
| 2 | Baud Rate | 1200;2400;4800;9600;19200;38400 |
| 3 | Parity | Even, Odd, None2, None1 |
| 4 | Energy Pulse Output | P: Real Energy; Q:Reactive Energy |
| 5 | Reactive Power Calculation | 0:True; 1:Generalized |
| 6 | Password | 0000-9999 |
| 7 | Real-time reading mode | 1: Primary; 2: Secondary |
| 8 | Wiring configuration | 3LN; 1LN; 1LL;2LL |
| 9 | CT2 | 5A/1A(5A Current Input) 80mA/100mA/200mA(mA Current Input) |
| 10 | CT1 | 1~50,000 |
| 11 | PT2 | 50~400 |
| 12 | PT1 | 50~1000000 |
| 13 | Pulse Constant | 1~60000 |

| Page | Parameter | Range |
|------|-----------------------------|----------|
| 14 | Pulse Width | 20~100ms |
| 15 | Energy Decimal places | 0-3 |
| 16 | Custom data display: Add | |
| 17 | Custom data display: Remove | |
| 18 | Wiring check enable | On; Off |

3.5 Meter Configuration

3.5.1 Initial Setup

The AcuRev 1310 series meters need to be configured correctly in order for it to measure data accurately.

For the initial meter setup, the wiring mode, PT and CT ratios need to be configured on the meter. Here are the steps to set these up from the meter display. Users must ensure that the lower terminal cover of the meter has been removed in order to gain access to the “SET” button.

- Once the terminal cover is removed, press the “SET” key to enter the settings mode.
- Users will then be prompted by a password screen. You can leave the password as its default value of “0000” if no password was previously configured. If a password was configured use the “SCROLL” and “SET” keys to enter in the password.
- The next screen that will appear is the “S-0-1 Addr”
- Press the “SCROLL” key until you get to the “S-08 Lt” screen(S-04 if AcuRev 1311). Select the correct voltage wiring mode. This will be based on your voltage connection. For example if your voltage connection is a three phase 4 wire connection, the correct voltage wiring mode would be 3LN.
 - Press “SET” to enter edit mode.
 - Press “SCROLL” to select the wiring mode.
 - Press “SET” to confirm the setting.

Note: Refer to Section 2.3 Wiring for more details about wiring configurations.

- Press the “SCROLL” key to move to the CT2 page. This setting should already be configured to the secondary value of the CT. After this is confirmed, press the “SCROLL” key to move to the next page.
- The ensuing page will be “S-10” for setting the primary rating of the CT. If no CT's are being used, leave this as the default value and press “SCROLL” to move to the next page. If CT's

are being used, enter in the primary rating of the CT here.

- Press “SET” to enter the edit mode and to move to the next digit.
- Press “SCROLL” to change the value of the digit.
- Press “SET” to confirm the setting and move to the next page.
- The next page will correspond to the PT2 setting. If no PT’s are being used, leave this setting as the default and press the “SCROLL” key to go to the next page. If you are using PT’s, enter the secondary value of the PT here.
 - Press “SET” to enter the edit mode and to move to the next digit.
 - Press “SCROLL” to change the value of the digit.
 - Press “SET” to confirm the setting and move to the next page.
- The next page will be “S-12” for the primary rating of the PT if it is being used.
 - Press the “SET” key to enter edit mode and to move to the next digit.
 - Press the “SCROLL” key to change the value of the digit.
 - Press the “SET” key to confirm the setting and move to the next page.

Once all of the initial meter configurations are set, the meter should now begin to read data correctly.

3.6 Energy Pulse Output

The AcuRev 1310 series supports the transmission of energy pulses through the P1 and P2 terminals of the meter. The AcuRev 1310 series uses the KYZ output to transmit test pulses that are proportional to the accumulated energy that the meter is measuring.

The maximum output voltage and current of the pulse output circuit in the AcuRev 1310 series is 250V and 100mA respectively.

Configuration

Ensure that the following configurations in the meter are correct to make certain the accuracy of the meter.

- Wiring Mode
- CT2
- CT1
- PT2
- PT1

To check these settings refer to section 3.5 in the meter configurations section of the manual.

With the above settings confirmed to ensure the meter will measure the voltage and current accurately, the next step is to configure the meter to output the desired number of pulses based on the required specification.

Make certain that you are in the settings mode. To get into the settings mode follow the procedure in section 3.5 of the manual.

- Once in the “Settings” mode, press the “SET” key to get to the “S-04 PULSE” page. This configuration is to enable the meter to output pulses based on the Active Energy (P) or the Reactive Energy (Q).
 - Press the “SET” key to modify the setting; the cursor should now flash.
 - Press the “SCROLL” key to select the type of energy to output.
 - Press the “SET” key to confirm the selection.
- Press the “SCROLL” key to get to the “S-13 Pn” page. This configuration will represent the number pulses (Pulse Constant) the meter will output per kWh/kvarh. This will be based on the required specification.
 - Press the “SET” key to modify; the first digit will begin to flash.
 - Press the “SET” key to move to the next flashing digit.
 - Press the “SCROLL” key to change the flashing digit’s number.
 - Press the “SET” key on the last digit to confirm all the changes after they have been made.

The following calculations can be used in order to calculate the value in the meter for the DO Pulse constant:

- First you will need to determine how many pulses are needed to represent 1 kWh or how many kWh will represent 1 pulse.
- In this procedure, we will assume that 1 pulse = 10kWh is what is needed. Then follow these steps:
 - Multiply the PT ratio and CT ratio i.e. $PT1/PT2 * CT1/CT2$.

Example: PT ratio of 6600V/120V, CT ratio of 2000:5A => $6600/120 * 2000/5 = 22,000$.

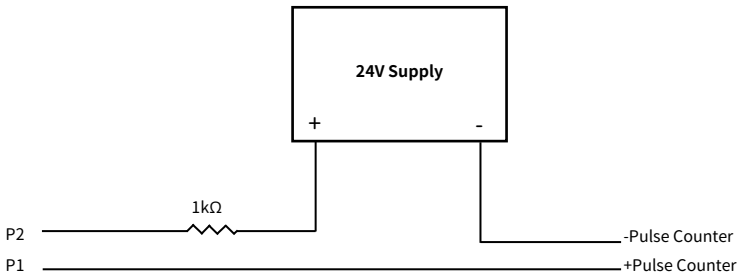
Note: if no PTS were used, then enter the PT ratio as the default on the meter, i.e. 400/400. If the CT2: 333mV, RCT or 80/100/200mA, consider this as 1A for the calculation.

- Divide 10kWh by 22,000 i.e. $(10/22000) \text{ kWh} = (1/2200) \text{ kWh}$.

- This means that 1 pulse = (1/2200)kWh, therefore 2200 pulses = 1kWh
- Since we get 2200 pulse/kWh, enter 2200 as the pulse constant into the meter
 - Press “SCROLL” to get to the “S-14 PH” page. This configuration will represent the pulse width of the pulse that the meter will output. Put in the pulse width for the pulse output. The range is 20-100ms.

Pulse Output Wiring

Figure 3-2 Pulse Output Wiring Diagram



- A 24V DC supply is required to power the circuit and should be connected to the P2 terminal of the meter.
- A 1 kilo ohm resistor is suggested to be used in series to limit the current to the P2 terminal (refer to Figure 3-2 above).
- The P1 terminal is connected to the positive terminal of the pulse counter.
- The negative terminal of the 24V DC supply is connected to the negative of the pulse counter.

With the pulse output circuit and settings configured the pulse output can be tested. Inject the meter with both voltage and current to ensure that the meter will accumulate energy and also output the pulses based on the above settings.

Chapter 4 Functions Functions and Software

4.1 Introduction to AcuRev 1310 Utility Software

4.2 Parameter Settings

4.3 Real Time Metering

4.4 Measurement Function

4.5 Event Logging

4.6 Alarm Function

4.7 Incorrect Connection Detection

4.8 Sealing Function

4.9 Device Information

This chapter will introduce you to using some important functions. Many advanced functions cannot be performed through the meters display. Due to this we made the AcuRev 1310 Utility software. This chapter will introduce you to some of the software’s functions.

Note: Only the AcuRev 1312, 1313 and 1314 can be connected through the AcuRev 1310 Utility Software. The AcuRev 1311 is not supported.

4.1 Introduction to AcuRev 1310 Utility Software

The AcuRev 1310 series meters can be accessed through the AcuRev 1310 Utility Software. The software can be downloaded from the Accuenergy website under Downloads, or using the following link: <https://accuenergy.com/page/support/download-manuals-datasheets-software-firmware>

The software can be used to read the meters measurements or to configure the meters settings. To connect to the software a USB-RS485 converter must be used.

Note: The AcuRev 1310 Utility Software is a Windows based software.

The following details the steps to connect the meter to the computer with the USB-RS485 converter.

To connect the following two wires should be connected from the USB-RS485 converter to the meter:

- 1) T/R+ from the converter to “A” on the AcuRev 1310 series meter
- 2) T/R- from the converter to “B” on the AcuRev 1310 series meter

The following figure shows the two wire connections.

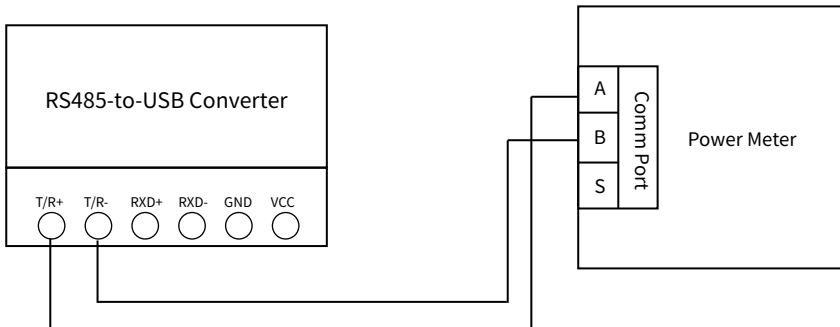


Figure 4-1 Connecting USB-RS485 converter to AcuRev 1310 Series Meter.

The Communication Port (COM Port) that the meter is connected to on the computer can be found from the “Device Manager” in Windows.

Use the following steps to get to the Device Manager on your Windows computer:

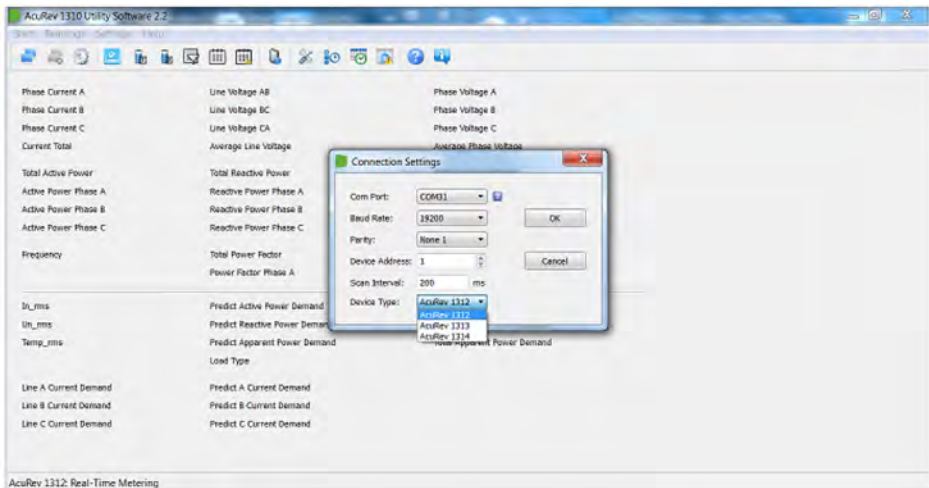
1. Open the Windows Start Menu.
2. Right Click on Computer and select Properties.
3. In the window that appears, select Device Manager from the left navigation panel.
4. In the Device Manager window, double click on Ports (COM&LPT) from the dropdown list.
5. Locate the USB Serial Port (COMx) information where the x is the port number to use. For example COM3.

Once the COM Port is found make note of it as it is used to connect to the software.

Once the software has been opened, users will be prompted to enter the correct COM port of the computer, baud rate, parity, the device address of the meter, and the device type (AcuRev 1312, 1313, 1314). Enter the settings and click ‘OK’ to connect the meter to the software.

Note: *The baud rate, parity, and device address must be the same on the meter as well as the AcuRev Utility Software.*

The following figure shows the screen when you first open AcuRev 1310 Utility Software.



4.2 Parameter Settings

The AcuRev 1310 series meters requires general settings so that the meters can work according to the correct specification. The general settings can be found by clicking on the “Settings” menu on the main menu toolbar and selecting “General Settings” on the top menu bar of the software. The figure below shows the General Settings.

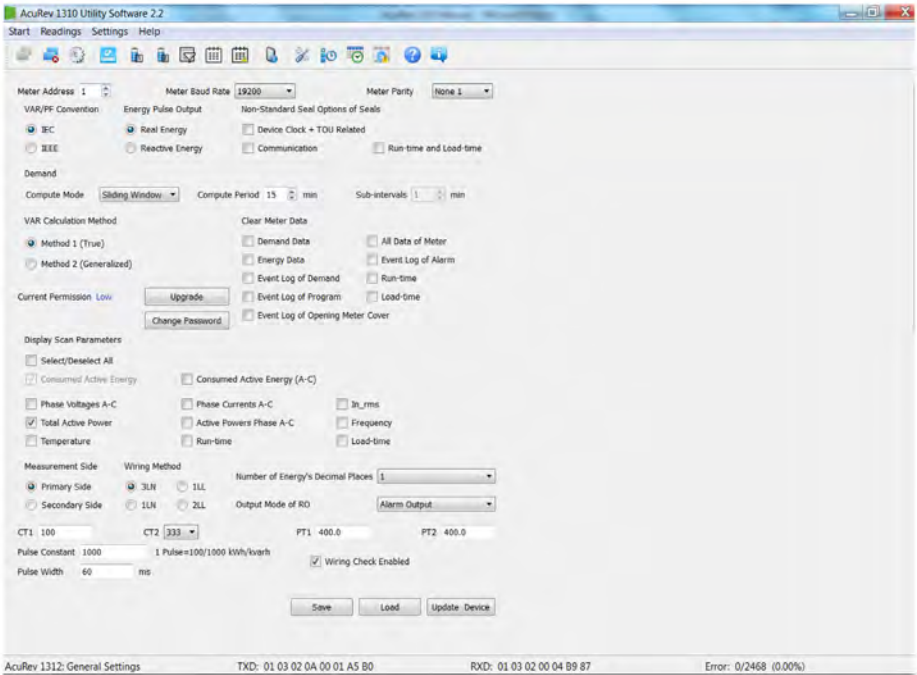


Figure 4-3 General Settings in the AcuRev 1310 Utility Software

Note: To ensure that any modifications in the General Settings takes place you must click on “Update Device” on the bottom of the General Settings page.

4.2.1 Wiring Method & CT/PT Settings

Users will need to select the correct “Wiring Method” (refer to section 2.3 for details). Users will also need to set the PT and CT ratio according to the practical use, if not set correctly this can lead to inaccurate measurements. “CT1” is the rated input of the CT being used, and “PT1”

and “PT2” correspond to the PT ratio of the PT used. The figure below shows these mentioned settings in the red boxes.

Measurement Side: Primary Side, Secondary Side

Wiring Method: 3LN, 1LN, 1LL, 2LL

Number of Energy's Decimal Places: 2

Output Mode of RO: Control Output

CT1: 100, CT2: 333, PT1: 400.0, PT2: 400.0

Pulse Constant: 1000, 1 Pulse=100/1000 kWh/kvarh

Pulse Width: 60 ms

Wiring Check Enabled

Buttons: Save, Load, Update Device

Figure 4-4 the Wiring Method and CT/PT settings in the General Settings

4.2.2 Reactive Power Calculation:

Real Reactive: $Q = \sqrt{(S^2 + P^2 + D^2)}$

Generally Reactive: $Q = \sqrt{(S^2 + P^2)}$

4.2.3 Modbus Communication Options:

At the very top of the General Settings page users can configure the meters address, baud rate and parity for communication with the meter through Modbus. The red box in Figure 4-5 shows how it is displayed in the AcuRev 1310 Utility Software.

AcuRev 1310 Utility Software 2.2

Start Readings Settings Help

Meter Address: 1, Meter Baud Rate: 19200, Meter Parity: None 1

VAR/FF Convention: IEC, IEEE

Energy Pulse Output: Real Energy, Reactive Energy

Non-Standard Seal Options of Seals: Device Clock + TOU Related, Communication, Run-time and Load-time

Figure 4-5 Meter address, baud rate, and meter parity settings on AcuRev 1310 Utility software

4.2.4 Energy Pulse Output

The AcuRev 1310 series supports the transmission of the pulses through the P1 and P2 terminals of the meter.

Active: P1, P2 terminal output pulse is based on the active energy pulse.

Reactive: the output pulse is based on the reactive power pulse.

You can see in the red box of the figure below the configuration for the Energy Pulse Output.

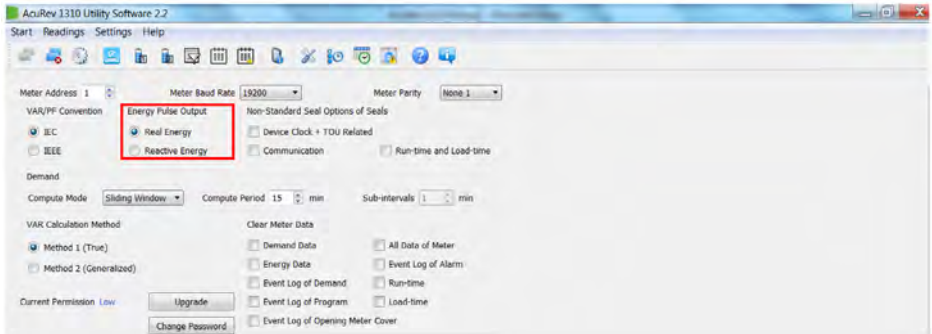


Figure 4-6 the Energy Pulse Output in the General Settings

The user will also have to enter the requirements for the pulse in the “Pulse Constant” and “Pulse Width” fields. The “Pulse Constant” is the number of pulses the user needs one pulse to represent in kWh/kvarh. The user can enter a value from 1-60000 for the pulse constant. The “Pulse Width” of the pulse is the duration it will last for. The user can enter a value from 20-100ms in this field. The figure below shows this in the red box.



Figure 4-7 the Pulse Constant and Pulse Width in the General Settings

4.2.5 Demand

Demand supports four kinds of calculation modes:

- Sliding Block Method

Set a 1-30min window time, which is the calculation time of demand. The window slides once per minute and updates the demand value at this time.

- Fixed Block Method

Set 1-30min as a demand calculation cycle. The whole cycle calculates the demand once. This means that the demand update time is equal to the demand calculation cycle.

- Rolling Block Method

Set 1-30min as a demand calculation cycle and 1 slip time. The demand cycle must be integer multiples of the slip time. It calculates 1 cycle's demand at the end of the slip time. The demand update time is equal to the slip time.

- Thermal Demand Method

Set 1-30min as a calculation cycle. In the whole cycle, the demand is calculated just once. This means that the demand update time is equal to the demand calculation cycle.

You can see the Demand calculations in the red box of the figure below. Under the dropdown menu in "Compute Mode" is where you can find the four different methods mentioned above.

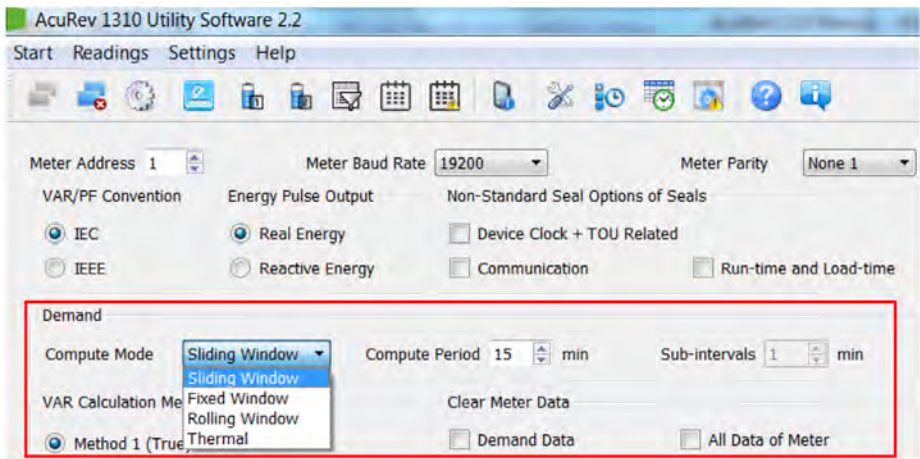


Figure 4-8 the Demand Calculation Modes in the General Settings of AcuRev1310 Utility Software

To View the demand parameter display click on ‘Readings’ on the main menu toolbar and then select ‘Demand’. Figure 4-9 shows the Demand display.

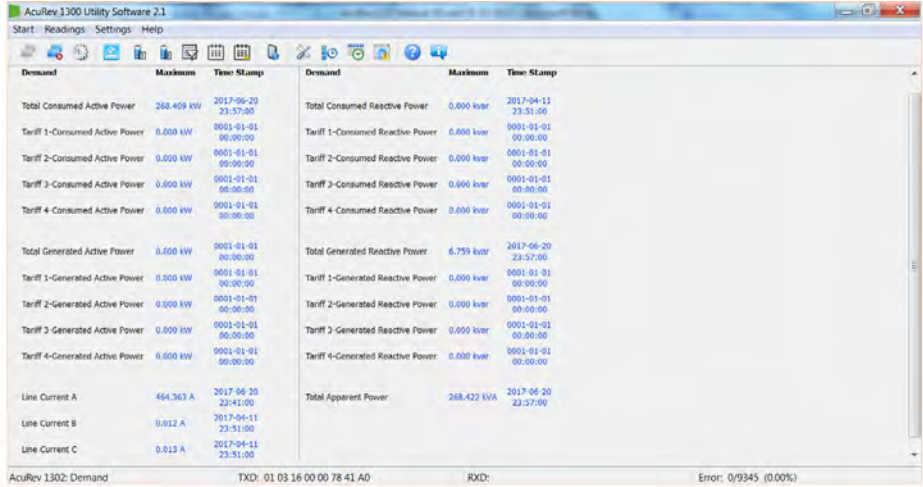


Figure 4-9 Demand Parameters Display

4.2.6 Sealing Option

- Choosing the “Device Clock + TOU related”, the corresponding content (Device Clock, TOU parameters, Daylight saving time parameters) can be sealed.
- Choosing “Run-time and Load-time” the content of the run and load time will be sealed.
- Choosing “Communication” the content of communication time will be sealed.

Note: To change the corresponding time it must occur once the seal is open.

The figure below shows the Sealing Options in the red box for the AcuRev 1310 Utility Software.

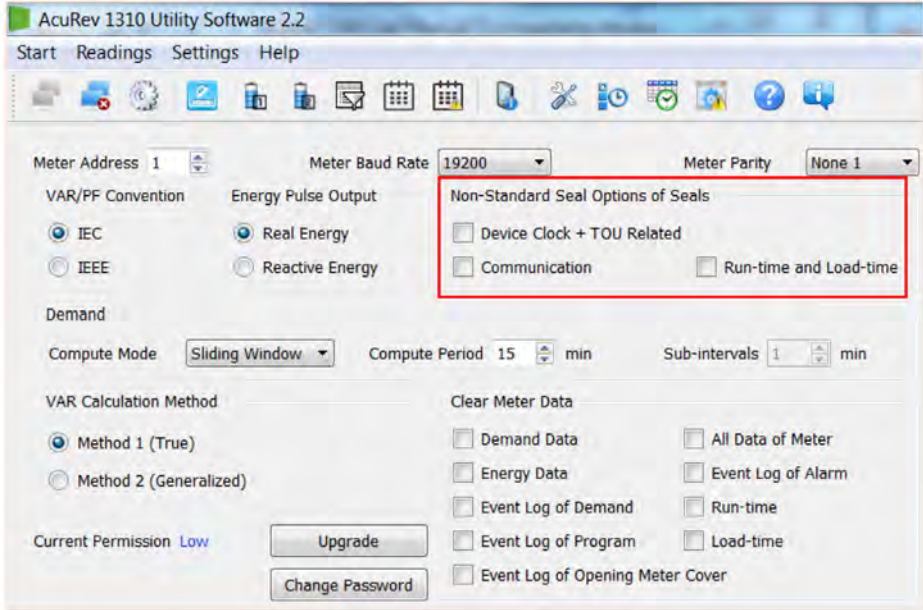


Figure 4-10 the Sealing Options in the General Settings

4.2.7 Communication Permission

The communication permission is divided into two settings either “low permission” or “high permission”.

- Low Permission: The important operations disabled. These operations include clear demand event record, programming event record, open cover event record, meter, energy data, and initial energy data.
- High Permission: This setting supports all functions.

Note: In the low permission you can update to high permission through updating the communication permission. After 30 minutes of updating to high permission, the meter would lower its permission to “low permission” automatically, to keep the meters safety.

The figure below shows the Communication Permission in the red box.

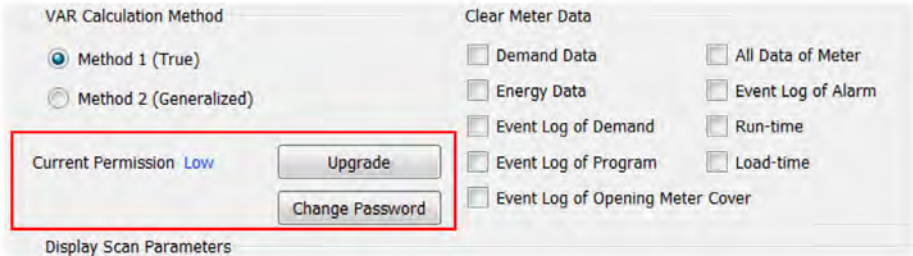


Figure 4-11 Communication Permission in the General Settings of the AcuRev 1310 Utility Software

4.2.8 Display Parameters

The user can add more parameters through the AcuRev 1310 Utility Software. Depending on the parameters chosen you will be able to view these parameters on the display by pressing the “SCROLL” key.

The figure below shows the Display Scan Parameters in the red box.

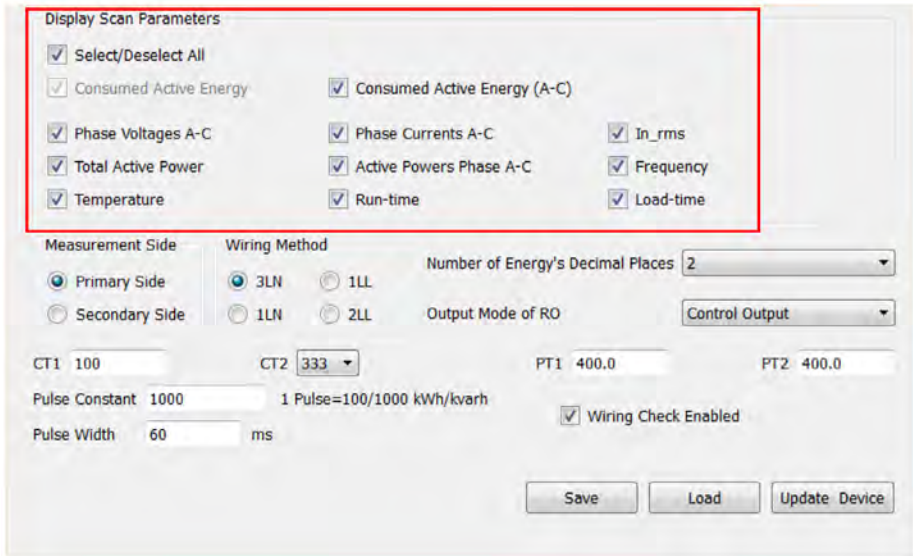


Figure 4-12 the Display Scan Parameters in the General Settings

4.2.9 Energy Decimal Places & RO output mode:

This setting is to change the number of decimal places in which the energy is read.

The RO (Relay Output) mode can be configured to control output or alarm output. The output can be configured according to the practical application.

You can see in the following figure the setting for the energy decimal place and RO output in the red box.

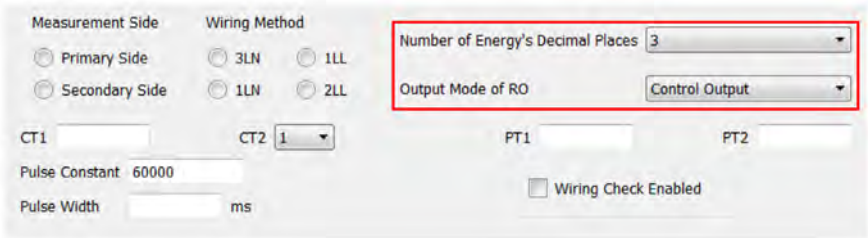


Figure 4-13 RO and Energy Decimal places in General Settings

4.3 Real-time Metering

Once connected successfully to the software, users will see the data readings appear in blue font beside each measurement parameter as shown in figure 4-14.

All metering parameters can be found by clicking on 'Readings' from the main menu toolbar and select 'Real-Time Metering'.

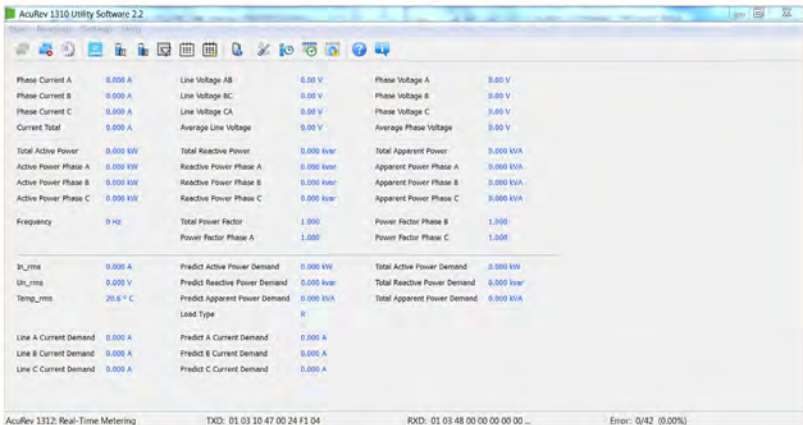


Figure 4-14 Real-Time Metering in the AcuRev 1310 Software

Users can also access the energy consumption by clicking on the “Readings” menu and selecting “Energy1”. You can refer to Figures 4-15 and 4-16 for assistance.

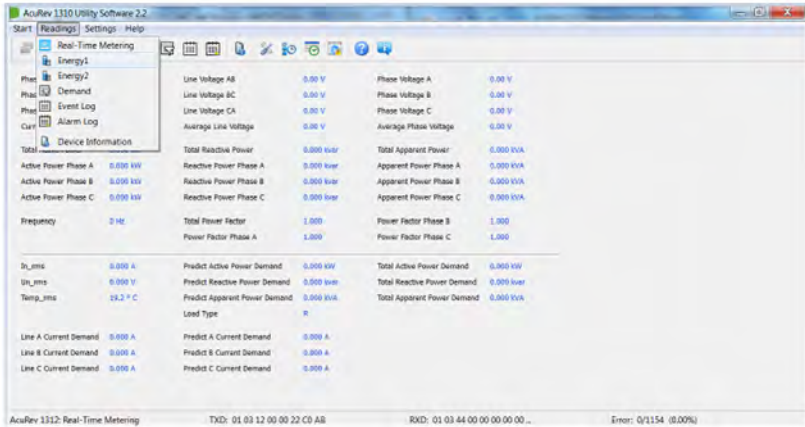


Figure 4-15 Navigating to Energy Readings

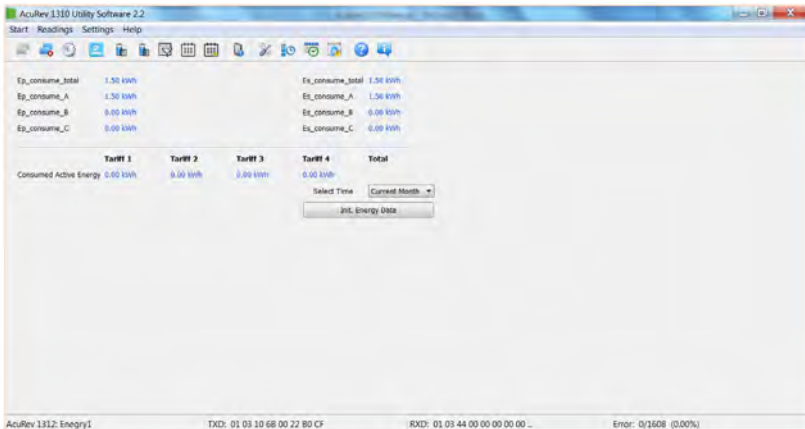


Figure 4-16 Energy Readings Page

Users will see all the energy that the meter has accumulated since the life of the meter or since the last time the energy readings were reset or cleared.

The lower half of the Energy1 page displays the consumed active energy readings that have been accumulated under the Time of Use (TOU) function of the meter.

Note: The Time of Use (TOU) function is only available on the AcuRev 1312, 1313, and 1314 models.

With the Time of Use function users can select the time period of the TOU energy as the current month, previous month or the past two months.

Users can also provide initial values for their AcuRev 1310 series models (only 1312, 1313, and 1314 applicable) to start to accumulate energy from. To do this, users must have sufficient permission, which can be obtained from the General Settings page.

4.4 Measurement Function

AcuRev 1310 series provides measurement of bi-directional energy accumulation. Real time energy can be initialized by changing the permission and sealing condition. The energy parameters supported:

- | | |
|---------------------------|-------------------------------|
| Consumed Active Energy | Four-quadrant Reactive Energy |
| Generated Active Energy | Consumed Reactive Energy |
| Total Active Energy | Generated Reactive Energy |
| Net Active Energy | Total Reactive Energy |
| Consumed Apparent Energy | Net Reactive Energy |
| Generated Apparent Energy | |

These parameters can be located on the Energy 2 Readings page, which can be found on the 'Readings' menu and selecting 'Energy 2'. Figure 4-17 show how this will look on the AcuRev 1310 Utility Software.

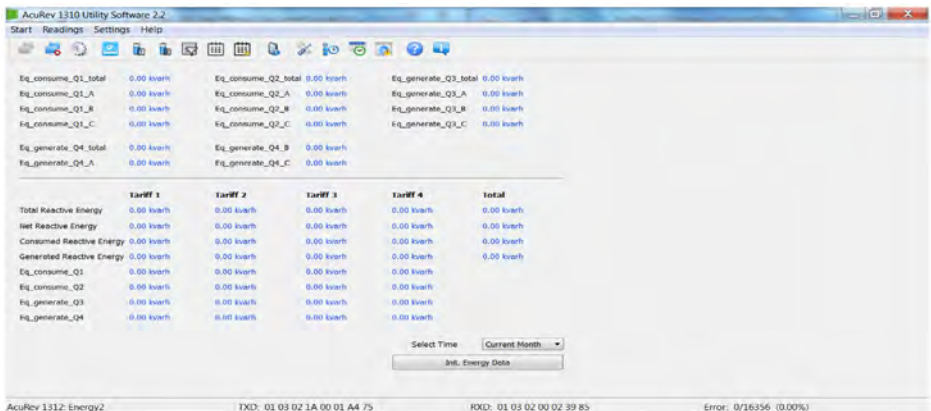


Figure 4-17 Energy 2 Readings Page

Note: The following settings for TOU (Time of Use) is only applicable to only certain AcuRev 1310 models which includes AcuRev 1312, 1313, and 1314 models.

TOU Settings

Users can assign up to 4 different tariffs (sharp, peak, valley and normal) to different time periods within the day according to the billing requirements.

The meter will calculate and accumulate energy in different tariffs according to the meters internal clock timing and TOU settings.

The following figure shows the Time of Use Setting Display Page.

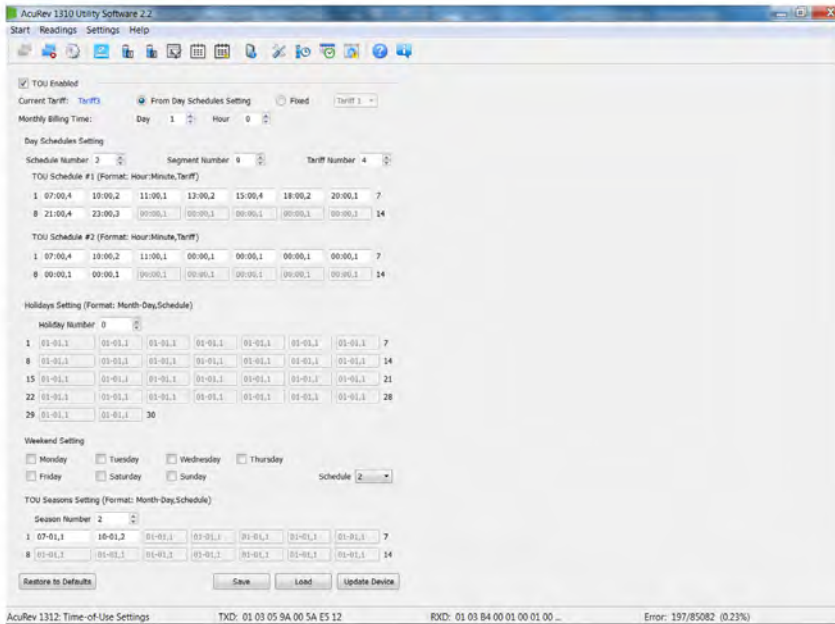


Figure 4-19 Time of Use Settings Page

TOU schedules can be configured up to 14 time segments, where each season can have its own TOU schedule. The user can customize the TOU calendar (including its tariffs, seasons, schedules and segments) according to different applications. To make sure that the TOU calendar is setup correctly, the meter will check the TOU settings according to the predefined rules (see below for “TOU Parameter Settings” for details). The TOU function will be disabled if the TOU calendar is set up incorrectly. If no errors are found in the calendar and the TOU function is enabled, TOU energy accumulation will commence.

TOU Parameter Settings:

a. Season Settings: The maximum number of Seasons is 14, where each Season can have its own TOU schedule.

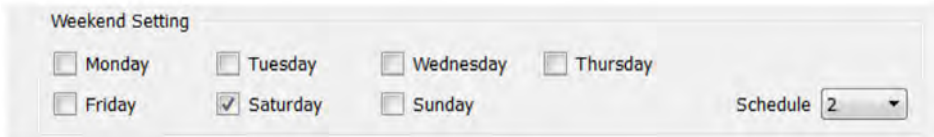
Note: *The seasons should be entered as an integer from 1-14 and should also be entered in chronological order.*

b. Schedule Settings: You can have a maximum of 8 schedules, where each schedule can be divided up into 14 time segments.

c. Segment Settings: You can have a maximum of 14 segments, where each segment can have its own tariff.

d. Tariff setting: There is a maximum of 4 tariffs. The four tariffs are sharp, peak, valley, and normal. They are represented by number 1-4 respectively (1: sharp, 2: peak, 3: valley, 4: normal). If the parameter is set as 2 then only the first 2 tariffs (sharp and peak) will be available.

e. Weekend Settings: In this section you can set up the schedule number according to weekends to assign a weekend schedule. Refer to Figure 4-20.



The image shows a web interface for configuring weekend settings. It features a section titled "Weekend Setting" with seven checkboxes for the days of the week: Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, and Sunday. The Saturday checkbox is checked. To the right of these checkboxes is a dropdown menu labeled "Schedule" with the number "2" selected.

Figure 4-20 Weekend Setting in TOU configurations page

f. Holiday Setting: You can set up to a maximum of 30 holidays

Note: *If the holiday and weekend schedule number is set as 0, it means holidays are unavailable. If the weekend and holidays are overlapped, the holiday overrides the weekend settings since the holiday has a higher priority.*

4.4.1 TOU Seasons

Fill in the appropriate slots in the TOU (Time of Use) Seasons based on the number in the “Season Settings”. If the “Season Settings” is set to 2 then only the first 2 slots of the “TOU Seasons” must be filled in.

Note: *If the slot is filled inappropriately then the TOU function will be disabled*

- The start date into the TOU Season slot is in the following format: “MM-DD-ID”
 - MM stands for month
 - DD stands for date
 - ID represents the TOU schedule (1-8)

Note: *The dates should be organized in chronological order (The earliest date comes first and the later date follows). Entering the dates in the wrong order will cause the TOU function to be disabled*

Holidays

Fill in the appropriate slots under the “Holidays” setting based on the number in the “Holiday Setting”. If the “Holiday Setting” is set as 3 then only the first 3 slots of the “Holidays” must be filled in otherwise the TOU function will be disabled.

- Enter the date of the Holiday in the Holiday schedule slot in the following format “MM-DD-ID”
 - MM stands for month
 - DD stands for date
 - ID represents the TOU schedule(1-4)

Note: *The dates of the Holiday schedules do not need to be organized in chronological order.*

TOU Schedules

Each TOU schedule is represented by a 24 hour cycle. Fill in the appropriate slots in the TOU schedule based on the number in the “Schedule Settings”. If the “Schedule Setting” is set as 8 then all of the “TOU Schedules” must be filled in.

The amount of slots to fill in each TOU Schedule depends on the “Segment Setting” parameter. If the “Segment Setting” parameter is set as 3 then the first 3 slots in each TOU Schedule must be set, otherwise the TOU function will be disabled.

- Enter the start time into the TOU Schedule slot in the following format “HH-MM-ID”
 - HH stands for hour in 24 hour format
 - MM stands for minutes
 - ID represents the tariff to follow (1-8)

The time should be organized in chronological order (The earliest time comes first and the later time follows).

Note: *Entering the time in the wrong order will cause the TOU function to be disabled*

4.4.2 Daylight Saving Time (DST)

There are two types of formats that the Daylight Savings Time can be enabled as:

1. Fixed date option:

If you choose a fixed date option, you set the format according to a fixed date for the DST switch, in the format of month/ day/ hour/ minute/ adjust time (in minutes).

2. Non-Fixed date option: If you choose the non-fixed option, the DST will be implemented by which day of the week, with the format as month/ which day/ which week/ hour/ minute/ adjust time (in minutes).

Setting the DST will cause the meter to automatically switch to and from daylight savings time. When the clock starts to run on daylight saving time, the meter will automatically adjust its clock to a time period in advance. While the clock is running to the end of daylight saving the meter will adjust its clock back to a pervious time period.

Note: Make sure to Click “Update Device” after making any changes in order to save the settings. If no errors are found then the TOU energy accumulation will begin.

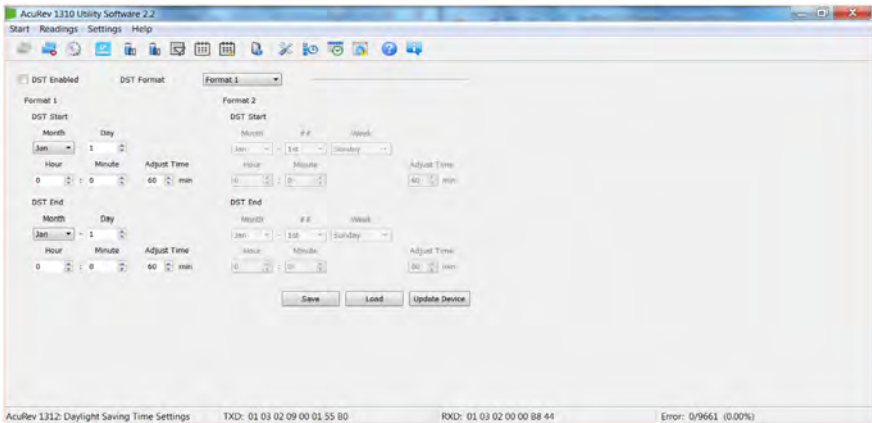


Figure 4-21 Daylight Saving Time Setting on AcuRev 1310 Utility Software

4.5 Event Logging

The AcuRev 1310 series supports event logging of important parameters and operation. The Event logging page can be found by clicking on the ‘Readings’ menu and selecting ‘Event Log’. Figure 4-22 shows how the Event Log will look in the AcuRev 1310 Utility Software.

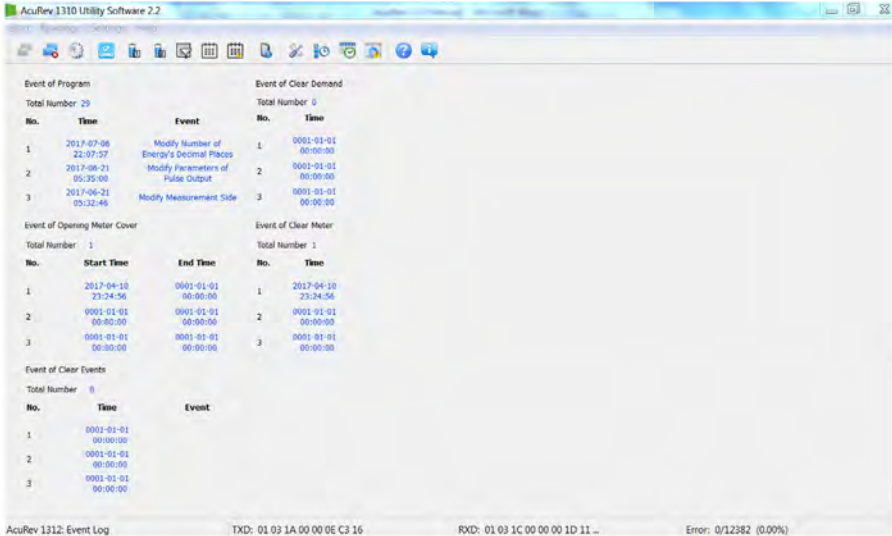


Figure 4-22 Event Log Page

The events that are logged include:

- **Event of Program**

This event records the programming time and programming event. When a programming event occurs several times within 5 minutes, the meter only records 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 calculation method programming event |

| | |
|-----|--|
| 08 | VAR/PF statue 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 |

| Event of Program | | |
|------------------|------------------------|---|
| Total Number 29 | | |
| No. | Time | Event |
| 1 | 2017-07-06 22:07:57 | Modify Number of Energy's Decimal Places |
| 2 | 2017-06-21 05:35:00 | Modify Parameters of Pulse Output |
| 3 | 2017-06-21 05:32:46 | Modify Measurement Side |

Figure 4-23 Event of Program in AcuRev 1310 Utility Software

- **Event of Clear Demand**

The meter will record when the Demand parameters are cleared. It records up to 3 groups of Clear Demand Events.

| Event of Opening Meter Cover | | |
|------------------------------|------------------------|------------------------|
| Total Number 1 | | |
| No. | Start Time | End Time |
| 1 | 2017-04-10 23:24:56 | 0001-01-01 00:00:00 |
| 2 | 0001-01-01 00:00:00 | 0001-01-01 00:00:00 |
| 3 | 0001-01-01 00:00:00 | 0001-01-01 00:00:00 |

Figure 4-25 Event of Opening Meter Cover in AcuRev 1310 Utility Software

- **Event of Clear Meter**

In the Event of Clear Meter, it shows when the meter has had any data cleared. It supports 3 groups of meter clearance events.



| 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 |

Figure 4-26 Event of Clear Meter 4.6 Alarm Function

4.6 Alarm Function

The alarm function is used to monitor specific parameters, and when these parameters exceed a certain preset time limit, the event alarm will be triggered and stored in the AcuRev 1310 Utility Software. There can be a maximum of 20 records stored in the alarm log. To access the Alarm Settings click on “Settings” from the toolbar menu and then select “Alarm Settings”.

To set up the alarms, users must first select an alarming parameter, a condition, a delay time (ms), and an alarming output. Users can set a maximum of 12 alarms. Figure 4-27 shows you the Alarm Settings.

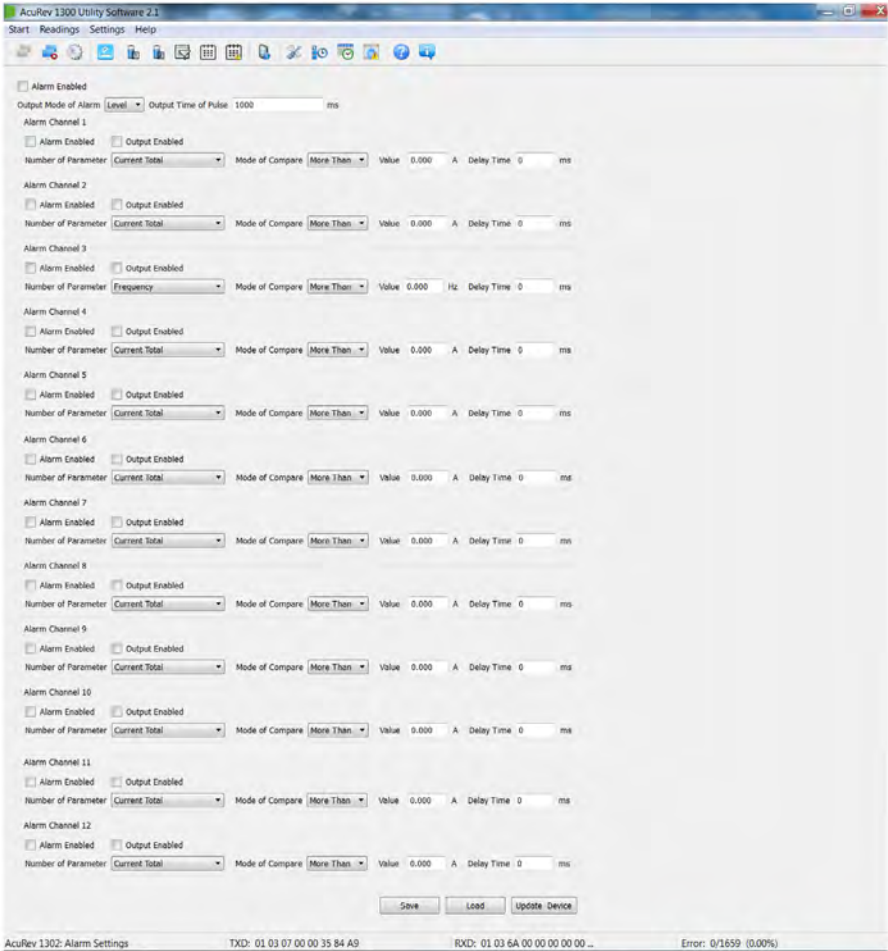


Figure 4-27 Alarm Settings Page on AcuRev 1310 Utility Software

4.6.1 Configuring the Alarm

- Enable the alarm function by checking off the “Alarm Enabled” box.
- Enable the preferred alarm channel(s) by checking off the “Alarm Enabled” box next to the channel.
- Under the “Alarm Channel” column select the parameter from the Real-time metering.
- Choose the required setting or condition for the alarm i.e. greater than (>), equal to (=), or less than (<).
- Enter the set point, where the set point is expressed by a percentage of the rated value.
- Enter in the desired Delay (ms) before alarm is triggered.
- Select the “Output Enabled” box if using a RO channel to be triggered when an alarm event occurs.

Note: Make sure to click on “Update Device” after making any changes in order to save the settings to the meter.

4.6.2 Reading the Alarm

To read the alarm log on the AcuRev 1310 Series Utility Software you click on the ‘Readings’ menu and select ‘Alarm Log’. The alarm log can be seen in Figure 4-28.

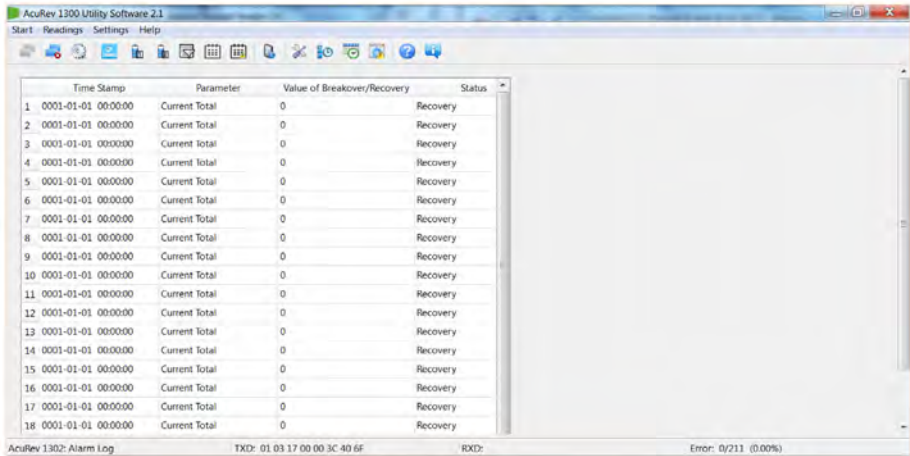


Figure 4-28 Alarm Log on AcuRev 1310 Series Utility Software

Referring to Figure 4-28, we can see that the alarm log features the time stamp which provides the time and date the alarm was triggered. The log also identifies which parameter was triggered (current, voltage, etc), and has a column for the value of Break Over which tells the user the amount they went over/under for that particular alarm setting. The last column of the alarm log is the status column. The alarm log can store up to 20 groups of alarm events.

4.7 Incorrect Connection Detection

The AcuRev 1310 series meter has a connection detection function. This function detects the connections or wiring to the meter based on the wiring mode configuration.

Table 4-2 Connection Detection

| 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 Connection | Phase Voltage B Wrong Connection | Phase Voltage C Wrong Connection |
| 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 Connection | Phase Current B Wrong Connection | Phase Current C Wrong Connection |

The very first screen in the All Parameters Display (see section 3.3 for details) is the voltage wiring check. On the LCD display, it will be in the following format:

U XXXXXX, where X is either '1' or '0'

- '0' represents the connection is correct
- '1' represents the connection is incorrect.

On the meter display digits 1~3 (from left to right) are would represent if a phase is not connected; Phase A Voltage missing, Phase B Voltage missing, Phase C Voltage missing. Digits 4~6 represent Phase A Voltage, Phase B, Phase C voltage being connected incorrectly.

The second screen in the All Parameters Display (see section 3.3 for details) is the current wiring check. On the meter display, it will be in the following format:

I XXXXXX, where X is either ‘1’ or ‘0’

- ‘0’ represents the connection is correct
- ‘1’ represents the connection is incorrect

On the meter display digits 1~3 (from left to right) represent Phase A CT, Phase B CT, Phase C CT being in the reverse direction . Digits 4~6 represent Phase A CT, Phase B CT, Phase C CT being connected incorrectly.

4.8 Sealing Function

The AcuRev 1310 series meter supports a sealing function. When the seal is open, the read write functions are available. When the seal is closed some of the meters functions which include parameters and optional parameters will be blocked and limited. These parameters can still be accessed by keys communication, but cannot be modified (Write function not available when seal is closed) when sealed status is present.

Address 209H corresponds to parameters blocked by the seal, which can be configured by users through communication. These settings will be valid only when the seal is in sealed status.

From 101H, we can check if the sealing state is opened or closed. When the seal status is open the address displays open sealing state. When the seal status is closed, the address displays closed sealing state, and the corresponding content will be blocked.

Note: ‘X’ means that these addresses will be blocked for keys and communication, and ‘-’ means this function is unavailable.

Seal Standard Content:

Table 4-3 Seal Standard Content

| Address | Parameter Description | Communication | Key |
|---------|---|---------------|-----|
| 203H | Pulse Quantity choice | X | X |
| 204H | Demand Calculation | X | - |
| 205H | Demand Calculation Cycle | X | - |
| 206H | Slip Time Demand Calculation | X | - |
| 207H | Reactive Power Calculation Method | X | X |
| 208H | VAR/PF Convention | X | - |
| 209H | Seal Optional Content | X | - |
| 213H | Remove Electric Meter Data (Except Demand Data) | X | - |
| 216H | Measurement Side | X | X |
| 217H | Wiring Mode | X | X |
| 218H | CT2 | X | X |
| 219H | CT1 | X | X |

| Address | Parameter Description | Communication | Key |
|-----------|-----------------------|---------------|-----|
| 220H | PT2 | X | X |
| 222H~223H | PT1 | X | X |
| 224H | Pulse Constant | X | X |
| 225H | Pulse Width | X | X |
| 226H | Energy Decimal Places | X | X |

Energy:

Table 4-4

| Modbus Address (HEX) | Parameter Description | Communication | Key |
|----------------------|--------------------------------|---------------|-----|
| 900H-901H | Total Active Energy | X | - |
| 902H-903H | Total Active Energy Tariff 1 | X | - |
| 904H-905H | Total Active Energy Tariff 2 | X | - |
| 906H-907H | Total Active Energy Tariff 3 | X | - |
| 908H-909H | Total Active Energy Tariff 4 | X | - |
| 91AH-90BH | Net Active Energy | X | - |
| 90CH-90DH | Net Active Energy Tariff 1 | X | - |
| 90EH-90FH | Net Active Energy Tariff 2 | X | - |
| 910H-911H | Net Active Energy Tariff 3 | X | - |
| 912H-913H | Net Active Energy Tariff 4 | X | - |
| 914H-915H | Import Active Energy | X | - |
| 916H-917H | Import Active Energy Tariff 1 | X | - |
| 918H-919H | Import Active Energy Tariff 2 | X | - |
| 91AH-91BH | Import Active Energy Tariff 3 | X | - |
| 91CH-91DH | Import Active Energy Tariff 4 | X | - |
| 91EH-91FH | Export Active Energy | X | - |
| 920H-921H | Export Active Energy Tariff 1 | X | - |
| 922H-923H | Export Active Energy Tariff 2 | X | - |
| 924H-925H | Export Active Energy Tariff 3 | X | - |
| 926H-927H | Export Active Energy Tariff 4 | X | - |
| 928H-929H | Total Reactive Energy | X | - |
| 92AH-92BH | Total Reactive Energy Tariff 1 | X | - |
| 92CH-92DH | Total Reactive Energy Tariff 2 | X | - |
| 92EH-92FH | Total Reactive Energy Tariff 3 | X | - |
| 930H-931H | Total Reactive Energy Tariff 4 | X | - |
| 932H-933H | Net Reactive Energy | X | - |
| 934H-935H | Net Reactive Energy Tariff 1 | X | - |
| 936H-937H | Net Reactive Energy Tariff 2 | X | - |
| 938H-939H | Net Reactive Energy Tariff 3 | X | - |
| 93AH-93BH | Net Reactive Energy Tariff 4 | X | - |
| 93CH-93DH | Import Reactive Energy | X | - |

| Modbus Address (HEX) | Parameter Description | Communication | Key |
|----------------------|---------------------------------|---------------|-----|
| 93EH-93FH | Import Reactive Energy Tariff 1 | X | - |
| 940H-941H | Import Reactive Energy Tariff 2 | X | - |
| 942H-943H | Import Reactive Energy Tariff 3 | X | - |
| 944H-945H | Import Reactive Energy Tariff 4 | X | - |
| 946H-947H | Export Reactive Energy | X | - |
| 948H-949H | Export Reactive Energy Tariff 1 | X | - |
| 94AH-94BH | Export Reactive Energy Tariff 2 | X | - |
| 94CH-94DH | Export Reactive Energy Tariff 3 | X | - |
| 94EH-94FH | Export Reactive Energy Tariff 4 | X | - |
| 950H-951H | Apparent Energy | X | - |

Sealed Nonstandard Parameters

Table 4-5

| Address | Parameter | Communication | Key |
|---------|---------------|---------------|-----|
| 300H | Clock: Year | X | X |
| 301H | Clock: Month | X | X |
| 302H | Clock: Date | X | X |
| 303H | Clock: Hour | X | X |
| 304H | Clock: Minute | X | X |
| 305H | Clock: Second | X | X |
| 306H | Clock: Week | X | X |

Note: When the seal is closed, standard time is valid within plus or minus 5 minutes, it will be invalid if not in this range.

Table 4-6

| Address | Parameter Description | Communication | Key |
|---|--|---------------|-----|
| TOU Related Parameters | | | |
| 402H-40EH | Time-Division Energy Setting Parameter 1 | X | - |
| 420H-5F3H | Time-Division Energy Setting Parameter 2 | X | - |
| Daylight Saving Time Related Parameters | | | |
| 350H-367H | Daylight Saving Time Related Parameters | X | - |

4.9 Device Information

All the information regarding the meter can be found by clicking on the “Readings” on the main menu toolbar and selecting “Device Information”. Figure 4-3 shows the Device Information page.

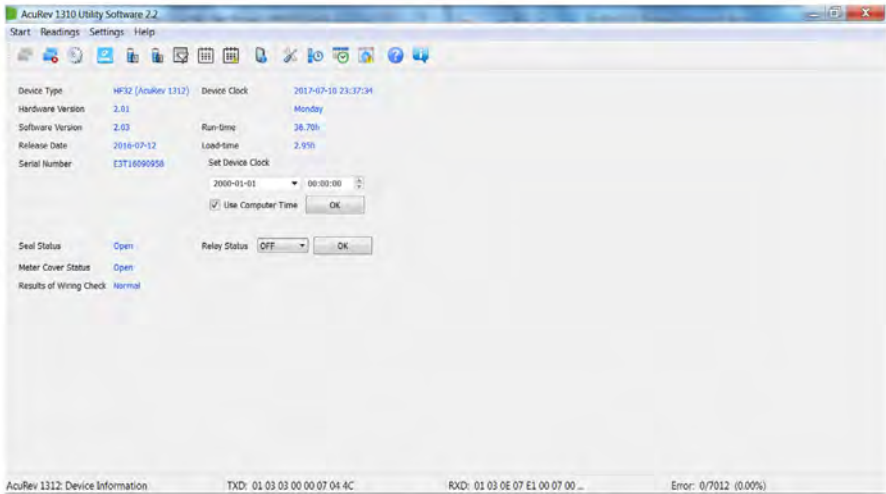


Figure 4-29 Device Information Page

Device Information such as hardware and software version of the meter can be found on this page. The Serial number and the seal status can also be located here. It is important to note that when the Seal Status is set to “Closed”, the user will be unable to make any configurations to the meter.

Users can also configure the device clock of the meter from this page to the time of the computer the meter is connected to or give it any other specific time.

Chapter 5: Communication

5.1 Modbus Protocol Information

5.2 Communication Format

5.3 Application Details



This chapter introduces users on how to communicate with the AcuRev 1310 Series meter through the Modbus communication protocol. Knowledge of the Modbus communication protocol would be beneficial for users who read this chapter.

The chapter's contents include the Modbus protocol, communication format, and application of the AcuRev 1310 series meter.

5.1 Modbus Protocol Information

5.1.1. 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 | 1 bit or 2 bit |
| Error checking | CRC |

5.1.2. Frame

When the data frame reaches the AcuRev 1310 series meter (slave device), the meter removes the data frame's header, and reads the data. If there is no error, then the meter will implement the data's task. Once the task is completed, the meter will put its own data with the acquired header and send back the frame to the master device that queried the meter. The response data frame contains the address, function, data and CRC check. An error will cause the response to fail.

Table 5-1 Data Frame Format

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

Address Field

The address field is the data at the start of the frame. It is composed of 8 bits (1 byte) and corresponds to the device address. It has a decimal value ranging from 1-247.

The master device addresses the slave device by placing the slave device address in the address field of the message. When the slave sends its response, it places its own address in the address field of response to let the master know which slave is responding.

Function Field

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

Table 5-2 Function Code

| Function Code | Meaning | Action |
|---------------|-------------------------|--|
| 03 | Read Holding Register | Obtain current value of 1 or more registers |
| 16 | Preset register | Set value of 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) |

Data Field

The data field contains the data that the slave device needs in order to complete the request. This data may be a numerical value, address or settings. For example, the function code tells the slave device to read one register, however the data field specifies readings from which register and how many registers to read.

Error Check Field

This field allows for error checks to be performed by both master and slave devices. Sources of errors such as electrical noise and other interferences can cause the data to be changed while it is being transmitted from one device to another. The error check ensures that the master or slave devices do not respond to the distorted data during the transmission. The error check rule used is the bit Cyclic Redundancy Check (CRC16).

5.2 Communication Format

Table 5-3 Protocol Illustration

| Addr | Fun | Data start register hi | Data start register lo | # of registers hi | # of registers lo | CRC16 Hi | CRC16 Lo |
|------|-----|------------------------|------------------------|-------------------|-------------------|----------|----------|
| 06H | 03H | 00H | 00H | 00H | 21H | 84H | 65H |

Addr: Slave device address

Fun: Function code

Data start register hi: High byte of starting register address

Data start register lo: Low byte of starting registers address

Data # of registers hi: High byte of number of registers

Data of # of registers lo: Low byte of number of registers

1. Read Data (Function Code 03H)

This function code allows the user to obtain the measurement data from the AcuRev 1310 series meter.

Below is an example of a query for reading three of the AcuRev 1310 series energy parameters. The query is requesting the total active energy, tariff 1 active energy and tariff 2 active energy from the meter device address of 17. The data type of the energy parameters are double words. The data for each parameter will be in 2 registers where each register contains 2 bytes. The registers for the parameters to be polled in this example are 900H-901H, 902H-903H and 904H-905H respectively.

Query:

Table 5-4 Query frame of Reading Energy

| Addr | Fun | Data start register hi | Data start register lo | # of registers hi | # of registers lo | CRC16 Hi | CRC16 Lo |
|------|-----|------------------------|------------------------|-------------------|-------------------|----------|----------|
| 11H | 03H | 00H | 00H | 00H | 21H | 84H | 65H |

Response:

The AcuRev 1310 series responds back to the master's query by responding with its slave device, function code, data and CRC check.

Below is the response from the AcuRev 1310 series meter for returning the total active energy (1.27kWh), tariff 1 energy (1.00 kWh) and tariff 2 energy (0.27kWh). When the values are returned to Modbus, they need to be scaled. The relationship for the energy data between the real value and the communication value is:

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 | Data 1 hi | Data 1 low | Data 2 hi | Data 2 low | Data 3 hi | Data 3 low | Data 4 hi | Data 4 low |
|------|-----|------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|
| 11H | 03H | 0CH | 00H | 00H | 00H | 7FH | 00H | 00H | 00H | 64H |

| Value hi | Value lo | Value hi | Value lo | CRC16 hi | CRC16 lo |
|----------|----------|----------|----------|----------|----------|
| 00H | 00H | 00H | 1BH | 96H | 8DH |

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

Function code 10H allows the user to write the contents of meters registers such as system parameters and energy initialization.

Below is an example on writing a value to the meters total active energy (0.2kWh).

Table 5-6 Preset Energy Data

| Addr | Fun | Byte Count | Data start register hi | Data start register lo | # of registers hi | #of registers lo | Byte Count |
|------|-----|------------|------------------------|------------------------|-------------------|------------------|------------|
| 11H | 10H | 0CH | 09H | 00H | 00H | 00H | 02H |

| Value hi | Value lo | Value hi | Value lo | CRC16 hi | CRC16 lo |
|----------|----------|----------|----------|----------|----------|
| 00H | 00H | 00H | 14H | CDH | 30H |

5.3 Application Details

5.3.1 Data Types

The data types supported by the AcuRev 1310 series meter have the following meanings:

Bit-binary value

Word-16 bit unsigned integer using one register that contains 2 bytes. The data range is 0-65535.

Int16-16 bit signed integer using one register that contains 4 bytes in total. The high bytes follow the low bytes in this data type. The data range is 0-4294897295.

Int32- 32 bit signed integer using two registers that contains 4 bytes in total. The data range is from 327698~32767.

Float-Single precision floating point number using two registers. The data range is-2147483648~22147483647.

5.3.2 Relationship between Communication value and Real value

The measurement values from the AcuRev 1310 series meter obtained through Modbus may not always be equal to the real value. The values may be scaled or a relationship may need to be applied.

Note: It is very important that the user is aware of these relationships when designing programs to poll the meter, otherwise the values may not be accurate.

Table 5-7 the relationship between communication value and real value

| Parameter | Relationship | Unit |
|--------------------------------------|---|--|
| System Parameter settings and Status | The communication value equals the real value | ---- |
| Real-time Clock, Timestamps | The communication value equals the real value | ---- |
| Electrical measurement parameters | | Electrical measurement parameters unit |
| PT1 & PT2 | Real = Communication/10 | ---- |
| Meter run time & Load time | Real = Communication/10 | Hours |

5.3.3 Parameter Address Table

Model 2, 3, 4 represents AcuRev1312, AcuRev 1313, and AcuRev 1314 respectively.

Read only block

03H- read command

Table 5-8 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 |
| 101H | 257 | Seals Status | Word | R | 0x0A: Seal sealed Others: Seal opened | | | |

System Parameter

System parameters decides the devices working mode.

10H- read command

03H- write command

Table 5-9 System Parameters Address Table

| MODBUS Address | | Parameter | Data | Access | Range | Default | Model | Register Number |
|----------------|---------|--|------|----------|--|---------|-------|-----------------|
| Hex | Decimal | Description | Type | Property | | | | |
| 200H | 512 | Meter Address | Word | R/W | 1-247 | 1 | 2-4 | 1 |
| 201H | 513 | Baud Rate | Word | R/W | 1200; 2400; 4800; 9600; 19200; 38400 | 19200 | 2-4 | |
| 202H | 514 | 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 | | |
| 203H | 515 | Energy Pulse Output Type | 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 | 1-30 minutes | 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 | Word | R/W | 0: IEC 1: IEEE | 0 | 2-4 | 1 |
| 209H | 521 | Sealed Parameters Selection | Word | R/W | Bit0: TOU set is Sealed or Not 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 in 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 Bit7: 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 not valid without Communication Revise Operation Authority | | 2~4 | 1 |
| 20EH | 526 | Optional Display Symbol 1 | | | Please see Appendix "Optional Display Symbol Setting" | | 2~4 | 1 |
| 20FH | 527 | Optional Display Symbol 2 | | | | | 2~4 | 1 |
| 210H | 528 | Parameter Measurement Side | Word | R/W | 0: Primary Side 1: Secondary Side | 0 | 2~4 | 1 |
| 211H | 529 | Wiring Mode | Word | R/W | 0:3LN 1:2LL 2:1LL 3:1LN | 0 | 2~4 | 1 |
| 212H | 530 | CT2 Value | Word | R/W | 1; 5; 100; 200; 333 | According to the order | 2~4 | 1 |
| 213H | 531 | CT1 Value | Word | R/W | 1~50000/5~50000 | 5 | 2~4 | 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 | 2~4 | 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 | 2~4 | 2 |
| 218H | 536 | Energy Pulse Constant | Word | R/W | 1-60000 | 5000 | 2~4 | 1 |
| 219H | 537 | Energy Pulse Width | Word | R/W | 20-100 ms | 80 | 2~4 | 1 |
| 21AH | 538 | Energy Display Decimal | Word | R/W | 0,1,2,3 | 1 | 2~4 | 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 | 2~4 | 1 |

Table 5-10 Real Time Reading Parameters

| MODBUS Address | | Parameter | Data Type | Property | Range | Default | # of registers |
|----------------|-----------|---|-----------|----------|-------|---------|----------------|
| Hex | Decimal | | | | | | |
| 2000H-2001H | 8192-8193 | Total Current | float | R | | | 2 |
| 2002H-2003H | 8194-8195 | Phase A Current | float | R | | | 2 |
| 2004H-2005H | 8196-8197 | Phase B Current | float | R | | | 2 |
| 2006H-2007H | 8198-8199 | Phase C Current | float | R | | | 2 |
| 2008H-2009H | 8200-8201 | Phase Average Voltage | float | R | | | 2 |
| 200AH-200BH | 8202-8203 | Phase A Voltage | float | R | | | 2 |
| 200CH-200DH | 8204-8205 | Phase B Voltage | float | R | | | 2 |
| 200EH-200FH | 8206-8207 | Phase C Voltage | float | R | | | 2 |
| 2001H-2011H | 8208-8209 | Line Average Voltage | float | R | | | 2 |
| 2012H-2013H | 8210-8211 | Line AB Voltage | float | R | | | 2 |
| 2014H-2015H | 8212-8213 | Line BC Voltage | float | R | | | 2 |
| 2016H-2017H | 8214-8215 | Line CA Voltage | float | R | | | 2 |
| 2018H-2019H | 8216-8217 | Frequency | float | R | | | 2 |
| 201AH-201BH | 8218-8219 | Total Active Power | float | R | | | 2 |
| 201CH-201DH | 8220-8221 | Phase A Active Power | float | R | | | 2 |
| 201EH-201FH | 8222-8223 | Phase B Active Power | float | R | | | 2 |
| 2020H-2021H | 8224-8225 | Phase C Active Power | float | R | | | 2 |
| 2022H-2023H | 8226-8227 | Total Apparent Power | float | R | | | 2 |
| 2024H-2025H | 8228-8229 | Phase A Apparent Power | float | R | | | 2 |
| 2026H-2027H | 8230-8231 | Phase B Apparent Power | float | R | | | 2 |
| 2028H-2029H | 8232-8233 | Phase C Apparent Power | float | R | | | 2 |
| 202AH-202BH | 8234-8235 | Total Reactive Power | float | R | | | 2 |
| 202CH-202DH | 8236-8237 | Phase A Reactive Power | float | R | | | 2 |
| 202EH- | | | | | | | 2 |
| 202FH | 8238-8239 | Phase B Reactive Power | float | R | | | 2 |
| 2030H-2031H | 8240-8241 | Phase C Reactive Power | float | R | | | 2 |
| 2032H-2033H | 8242-8243 | Power Factor | float | R | | | 2 |
| 2034H-2035H | 8244-8245 | Phase A PF | float | R | | | 2 |
| 2036H-2037H | 8246-8247 | Phase B PF | float | R | | | 2 |
| 2038H-2039H | 8248-8249 | Phase C PF | float | R | | | 2 |
| 203AH-203BH | 8250-8251 | Phase Angle V1/V1 | float | R | | | 2 |
| 203CH-203DH | 8252-8253 | Phase Angle of V2 to V1 V1/V2 Phase Angle of V23 to V12 V12/V23 | float | R | | | 2 |
| 203EH-203FH | 8254-8255 | Phase Angle of V3 to V1 V1/V3 Phase Angle of V31 to V12 V12/V31 | float | R | | | 2 |

| | | | | | | | |
|-------------|-----------|--|-------|---|--|--|---|
| 2040H-2041H | 8256-8257 | Phase Angle of I1 to V1 V1/I1 Phase Angle of I1 to V12 V12/I1 | float | R | | | 2 |
| 2042H-2043H | 8258-8259 | Phase Angle of I2 to V1 V1/I2 Phase Angle of I2 to V12 V12/I2 | float | R | | | 2 |
| 2044H-2045H | 8260-8261 | Phase Angle of I3 to V1 V1/I3 Phase Angle of I3 to V12 | float | R | | | 2 |
| 1208H-1209H | 4616-4617 | System Active Power Demand | float | R | | | 2 |
| 120AH-120BH | 4618-4619 | System Reactive Power Demand | float | R | | | 2 |
| 120CH-120DH | 4620-4621 | System Apparent Power Demand | Float | R | | | 2 |
| 120EH-120FH | 4622-4623 | Phase A Current Demand | Float | R | | | 2 |
| 1210H-1211H | 4624-4625 | Phase B Current Demand | Float | R | | | 2 |
| 1212H-1213H | 4626-4627 | Phase C Current Demand | Float | R | | | 2 |

Energy: Function Code: 03H to Read; 10H to Write

Table 5-11 Real Time Energy Parameters

| MODBUS Address | | Parameter | Data Type | Property | Range | Default | # of registers |
|----------------|-----------|--------------------------------------|-----------|----------|-----------------|---------|----------------|
| Hex | Decimal | | | | | | |
| 2046H-2047H | 8262-8263 | Total Active Energy Exported | Dword | R/W | 0-9999999999kWh | | 2 |
| 2048H-2049H | 8264-8265 | Total Active Energy Exported Phase A | Dword | R/W | 0-9999999999kWh | | 2 |
| 204AH-204BH | 8266-8267 | Total Active Energy Exported Phase B | Dword | R/W | 0-9999999999kWh | | 2 |
| 204CH-204DH | 8268-8269 | Total Active Energy Exported Phase C | Dword | R/W | 0-9999999999kWh | | 2 |
| 204EH-204FH | 8270-8271 | Total Active Energy Imported | Dword | R/W | 0-9999999999kWh | | 2 |
| 2050H-2051H | 8272-8273 | Total Active Energy Imported Phase A | Dword | R/W | 0-9999999999kWh | | 2 |
| 2052H-2053H | 8274-8275 | Total Active Energy Imported Phase B | Dword | R/W | 0-9999999999kWh | | 2 |
| 2054H-2055H | 8276-8277 | Total Active Energy Imported Phase C | Dword | R/W | 0-9999999999kWh | | 2 |

| MODBUS Address | | Parameter | Data Type | Property | Range | Default | # of registers |
|----------------|-----------|---------------------------------------|-----------|----------|----------------|---------|----------------|
| Hex | Decimal | | | | | | |
| 2056H-2057H | 8278-8279 | Total Apparent Power Exported | Dword | R/W | 0-999999999kWh | | 2 |
| 2058H-2059H | 8280-8281 | Total Apparent Power Exported Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 205AH-205BH | 8282-8283 | Total Apparent Power Exported Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 205CH-205DH | 8284-8285 | Total Apparent Power Exported Phase C | Dword | R/W | 0-999999999kWh | | 2 |
| 205EH-205FH | 8286-8287 | Total Apparent Power Imported | Dword | R/W | 0-999999999kWh | | 2 |
| 2060H-2061H | 8288-8289 | Total Apparent Power Imported Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 2062H-2063H | 8290-8291 | Total Apparent Power Imported Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 2064H-2065H | 8292-8293 | Total Apparent Power Imported Phase C | Dword | R/W | 0-999999999kWh | | 2 |
| 2066H-2067H | 8294-8295 | Total Reactive Imported Q1 | Dword | R/W | 0-999999999kWh | | 2 |
| 2068H-2069H | 8296-8297 | Total Reactive Imported Q1 Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 206AH-206BH | 8298-8299 | Total Reactive Imported Q1 Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 206CH-206DH | 8300-8301 | Total Reactive Imported Q1 Phase C | Dword | R/W | 0-999999999kWh | | 2 |
| 206EH-206FH | 8302-8303 | Total Reactive Imported Q2 | Dword | R/W | 0-999999999kWh | | 2 |
| 2070H-2071H | 8304-8305 | Total Reactive Imported Q2 Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 2072H-2073H | 8306-8307 | Total Reactive Imported Q2 Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 2074H-2075H | 8308-8309 | Total Reactive Imported Q2 Phase C | Dword | R/W | 0-999999999kWh | | 2 |
| 2076H-2077H | 8310-8311 | Total Reactive Imported Q3 | Dword | R/W | 0-999999999kWh | | 2 |
| 2078H-2079H | 8312-8313 | Total Reactive Imported Q3 Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 207AH-207BH | 8314-8315 | Total Reactive Imported Q3 Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 207CH-207DH | 8316-8317 | Total Reactive Imported Q3 Phase C | Dword | R/W | 0-999999999kWh | | 2 |
| 207EH-207FH | 8318-8319 | Total Reactive Imported Q4 | Dword | R/W | 0-999999999kWh | | 2 |
| 2080H-2081H | 8320-8321 | Total Reactive Imported Q4 Phase A | Dword | R/W | 0-999999999kWh | | 2 |
| 2082H-2083H | 8322-8323 | Total Reactive Imported Q4 Phase B | Dword | R/W | 0-999999999kWh | | 2 |
| 2084H-2085H | 8324-8325 | Total Reactive Imported Q4 Phase C | Dword | R/W | 0-999999999kWh | | 2 |

Table 5-12 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 | 0~6 0: Sunday 1~6 Monday-Saturday | 6 | 2~4 | 1 |
| 310H-311H | 784-785 | Run_time | Uint32 | | 0-999999999 (Communication value is 100 times of the real value) | | 2~4 | 2 |
| 312H-313H | 786-787 | Load_time | Uint32 | | 0-999999999 (Communication value is 100 times of the real value) | | 2~4 | 2 |

Daylight Saving Time Setting (03H: Read 10H: Write)

Table 5-13 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 | 854 | 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 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 | 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 | |

Time of Use (TOU) Energy

Table 5-14 TOU Energy Address

| MODBUS Address | | Parameter Description | Data Type | R/W | 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 the TOU Tariff Number is set as 1, Communication | 1 | 2~4 | 1 |
| 40EH | 1038 | TOU Settings – reset to factory default | Word | R/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, 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 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 | 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 | | 05-02 03 | 2~4 | 3 |
| 5A0H- 5A2H | 1440-1442 | The 3rd special day (Month, Day, Schedule Table number) | | R/W | | 00-00 00 | 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 |

Table 5-15 Last/Previous Month Demand Max

| MODBUS Address | | Parameter Description | Data Type | Property | Range | Model | Register Number |
|----------------|-----------|--|------------------|----------|--|-------|-----------------|
| Hex | Decimal | | | | | | |
| 1800H-1801H | 6144-6145 | Total Imported Active Power Demand Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1802H-1804H | 6146-6147 | Total Imported Active Power Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1805H-1806H | 6148-6149 | Imported Active Power Demand 1 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1807H-1809H | 6150-6151 | Imported Active Power Demand 1 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 180AH-180BH | 6152-6153 | Imported Active Power Demand 2 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 180CH-180EH | 6154-6155 | Imported Active Power Demand 2 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 180FH-1810H | 6156-6157 | Imported Active Power Demand 3 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1811H-1813H | 6158-6159 | Imported Active Power Demand 3 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1814H-1815H | 6160-6161 | Imported Active Power Demand 4 Peak | Fl1802H-1804Hoat | R | Xx.xxxx kw | 2~4 | 2 |
| 1816H-1818H | 6162-6163 | Imported Active Power Demand 4 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1819H-181AH | 6164-6165 | Total Exported Active Power Demand Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 181BH-181CH | 6166-6167 | Total Exported Active Power Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 181DH-181EH | 6168-6169 | Exported Active Power Demand 1 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 181FH-1821H | 6170-6171 | Exported Active Power Demand 1 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1822H-1823H | 6172-6173 | Exported Active Power Demand 2 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1824H-1826H | 6174-6175 | Exported Active Power Demand 2 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |

| | | | | | | | |
|-------------|-----------|--|-------|---|---|-----|---|
| 1827H-1828H | 6176-6177 | Exported Active Power Demand 3 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1829H-182BH | 6178-6179 | Exported Active Power Demand 3 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 182CH-182DH | 6180-6181 | Exported Active Power Demand 4 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 182EH-1830H | 6182-6183 | Exported Active Power Demand 4 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1831H-1832H | 6184-6185 | Total Imported Reactive Power Demand Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1833H-1835H | 6186-6187 | Total Imported Reactive Power Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1836H-1837H | 6188-6189 | Imported Reactive Power Demand 1 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1838H-183AH | 6190-6191 | Imported Reactive Power Demand 1 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 183BH-183CH | 6192-6193 | Imported Reactive Power Demand 2 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 183DH-183FH | 6194-6195 | Imported Reactive Power Demand 2 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1840H-1841H | 6196-6197 | Imported Reactive Power Demand 3 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1842H-1844H | 6198-6199 | Imported Reactive Power Demand 3 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1845H-1846H | 6200-6201 | Imported Reactive Power Demand 4 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1847H-1849H | 6202-6203 | Imported Reactive Power Demand 4 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 184AH-184BH | 6204-6205 | Total Exported Reactive Power Demand Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 184CH-184EH | 6206-6207 | Total Exported Reactive Power Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 184FH-1850H | 6208-6209 | Exported Reactive Power Demand 1 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |

| | | | | | | | |
|-------------|-----------|--|-------|---|--|-----|---|
| 1851H-1853H | 6210-6211 | Exported Reactive Power Demand 1 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1854H-1855H | 6212-6213 | Exported Reactive Power Demand 2 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1856H-1858H | 6214-6215 | Exported Reactive Power Demand 2 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1859H-185AH | 6216-6217 | Exported Reactive Power Demand 3 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 185BH-185DH | 6218-6219 | Exported Reactive Power Demand 3 Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 185FH-1860H | 6220-6221 | Exported Reactive Power Demand 4 Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1861H-1863H | 6222-6223 | Exported Reactive Power Demand 4 Peak H Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1864H-1865H | 6224-6225 | Total Apparent Power Demand Peak | Float | R | Xx.xxxx kw | 2~4 | 2 |
| 1866H-1868H | 6226-6227 | Total Apparent Power Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1869H-186AH | 6228-6229 | Phase A Current Demand Peak | | R | Xx.xxxx A | 2~4 | 2 |
| 186BH-186DH | 6230-6231 | Phase A Current Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 186EH-186FH | 6232-6233 | Phase B Current Demand Peak | Float | R | Xx.xxxx A | 2~4 | 2 |
| 1870H-1872H | 6234-6235 | Phase B Current Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |
| 1873H-1874H | 6236-6237 | Phase C Current Demand Peak | | R | Xx.xxxx A | 2~4 | 2 |
| 1875H-1877H | 6238-6239 | Phase C Current Demand Peak Time | Dword | R | YY/MM/DD/hh/mm/ss (Second always is 0) | 2~4 | 3 |

Table 5-16 TOU Week Alternatives

| MODBUS Address | | Parameter Description | Data Type | Access Property | Range | Default | Model | Register Number |
|----------------|---------------|--|-----------|-----------------|---|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 7F00H | 32512 | Enable Weekend Alternative | word | R/W | 1: Enable; 0: Disable | 0 | 2~4 | 1 |
| 7F01H | 32513 | Season 1: Sign of the Weekend | word | R/W | Bit0: Sunday, 1 Enable, 0 Disable; Bit1: Monday, 1 Enable, 0 Disable; Bit6: Saturday, 1 Enable, 0 Disable; | 0 | 2~4 | 1 |
| 7F02H | 32514 | Season 1: The schedule Table number of Sunday | word | R/W | | 0 | 2~4 | 1 |
| 7F03H | 32515 | Season 1: The schedule Table number of Monday | word | R/W | | 0 | 2~4 | 1 |
| 7F04H | 32516 | Season 1: The schedule Table number of Tuesday | word | R/W | | 0 | 2~4 | 1 |
| 7F05H | 32517 | Season 1: The schedule Table number of Wednesday | word | R/W | | | 2~4 | 1 |
| 7F06H | 32518 | Season 1: The schedule Table number of Thursday | word | R/W | | | 2~4 | |
| 7F07H | 32519 | Season 1: The schedule Table number of Friday | word | R/W | | | 2~4 | |
| 7F08H | 32520 | Season 1: The schedule Table number of Saturday | word | R/W | | | 2~4 | |
| 7F09H - 7F10H | 32521-32522 | Season 2 of Week-end Alternative | word | R/W | | | 2~4 | |
| 7F11H - 7F18H | 32523 - 32536 | Season 3 of Week-end Alternative | word | R/W | | | 2~4 | |
| 7F19H - 7F20H | 32537-32538 | Season 4 of Week-end Alternative | word | R/W | | | 2~4 | |
| 7F21H - 7F28H | 32539 - 32552 | Season 5 of Week-end Alternative | word | R/W | | | 2~4 | |

| | | | | | | | | |
|-----------------|------------------|---------------------------------------|------|-----|--|--|-----|--|
| 7F29H -7F30H | 32553 -32554 | Season 6 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F31H -7F38H | 32555 - 32568 | Season 7 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F39H -7F40H | 32569 -32570 | Season 8 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F41H -7F48H | 32571 - 32584 | Season 9 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F49H -7F50H | 32585 - 32586 | Season 10 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F51H -7F58H | 32587 - 32600 | Season 11 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F59H -7F60H | 32601-32602 | Season 12 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F61H -7F68H | 32603 - 32616 | Season 13 of Week- end Alternative | word | R/W | | | 2~4 | |
| 7F69H -7F70H | 32617 - 32618 | Season 14 of Week- end Alternative | word | R/W | | | 2~4 | |

Rate parameter error information word 1 (basic parameter)

Table 5-17 Rate parameter error information word 1

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

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

Table 5-18 Rate parameter error information word 2

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

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

Table 5-19 Alarm Parameters

| MODBUS Address | | Parameter Description | Data Type | R/W | 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 |
| 702 | 1794 | Alarm Channel Output | Word | R/W | Bit0~ Bit11: Alarm Channel 0-11 1: Enable; 0: Disable | 0 | 2~4 | 1 |
| 703 | 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 Parameter 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: larger; 1: equal; 2: less | 0 | 2~4 | 1 |
| 708H | 1800 | Delay Time | Word | R/W | 0~3000 (x10ms) | 0 | 2~4 | 1 |
| Alarm Parameter Setting for the 2nd 12th group | | | | | | | | |
| 709H-703BH | 1801-1851 | The same as above | Word | R/W | | | 2~4 | 44 |

Table 5-20 SunSpec System Information Address

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|-----------------|---------------|--|-----------|-----|--|-------------------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1000H -1001H | 4096 -4097 | SunSpec_ID | Uint16 | R | 0x53756e53 | 1 | 2~4 | 2 |
| 1002H | 4098 | ID | Uint16 | R | 1 | 1 | 2~4 | 1 |
| 1003H | 4099 | Length | Uint16 | R | 65 | 6 | 2~4 | 1 |
| 1004H -1013H | 4100-4115 | Manufacturer | String | R | Well known value registered with SunSpec for compliance | Accuenergy | 2~4 | 16 |
| 1014H -1023H | 4116-4131 | Model | String | R | Manufacturer specific value (32 characters) | AcuRev 1310 | 2~4 | 16 |
| 1024H -102BH | 4132-4139 | Options | String | R | Manufacturer specific value (16 characters) | AcuRev 1310 | 2~4 | 8 |
| 102CH -1033H | 4140-4147 | Version | String | R | Manufacturer specific value (32 characters) | H: 1.10 S;1.01 | 2~4 | 8 |
| 1034H -1043H | 4148-4163 | Serial Number | String | R | Manufacturer specific value (32 characters) | | 2~4 | 16 |
| 1044H | 4164 | Device Address | Uint16 | R/W | Modbus device address | | 2~4 | 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 | | 2~4 | 1 |
| 1046H | 4166 | Length | Uint16 | R | 105 | | 2~4 | 1 |
| 1047H | 4167 | Amps (total): SunSpec; Total Current AcuRev 1310 | Int16 | R | 0-9999 A | | 2~4 | 1 |
| 1048H | 4168 | Amps Phase A: SunSpec; Phase A Current AcuRev 1310 | Int16 | R | 0-9999 A | | 2~4 | 1 |
| 1049H | 4169 | Amps Phase B: SunSpec; Phase B Current: AcuRev 1310 | Int16 | R | 0-9999 A | | 2~4 | 1 |
| 104AH | 4170 | Amps Phase C: SunSpec; Phase C Current AcuRev 1310 | Int16 | R | 0-9999 A | | 2~4 | 1 |
| 104BH | 4171 | Current scale factor: SunSpec; CT Ratio: AcuRev 1310 | Sunssf | R | -3~+5 (used as exponent of a power of 10) | | 2~4 | 1 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|----------------|---------|--|-----------|-----|-----------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 104CH | 4172 | Voltage LN (average): SunSpec; CT Ratio: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 104DH | 4173 | Phase Voltage AN: SunSpec; Phase Average Voltage: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 104EH | 4174 | Phase Voltage BN: SunSpec; Phase B Voltage: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 104FH | 4175 | Phase Voltage CN: SunSpec; Phase C Voltage: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 1050H | 4176 | Voltage LL (average): SunSpec; Line Average Voltage: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 1051H | 4177 | Phase Voltage AB: SunSpec; Line AB Voltage: AcuRev1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 1052H | 4178 | Phase Voltage BC: SunSpec; Line BC Voltage AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 1053H | 4179 | Phase Voltage CA: SunSpec; Line CA Voltage: AcuRev 1310 | Int16 | R | 0-9999 V | | 2~4 | 1 |
| 1054H | 4180 | Voltage scale factor: SunSpec | Sunssf | R | -2~2 | | 2~4 | 1 |
| 1055H | 4181 | Frequency | Int16 | R | 45Hz-65Hz | | 2~4 | 1 |
| 1056H | 4182 | Frequency scale factor | Sunssf | R | -2 | | 2~4 | 1 |
| 1057H | 4183 | Total Real Power SunSpec; Total Active Power: AcuRev 1310 | Int16 | R | 0-9999 W | | 2~4 | 1 |
| 1058H | 4184 | Watts Phase A: SunSpec; Total Active Power: AcuRev 1310 | Int16 | R | 0-9999 W | | 2~4 | 1 |
| 1059H | 4185 | Watts Phase A: SunSpec; Phase A Active Power: AcuRev 1310 | Int16 | R | 0-9999 W | | 2~4 | 1 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|----------------|---------|---|-----------|-----|------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 105AH | 4186 | Watts Phase C: SunSpec; Phase C Active Power: AcuRev 1310 | Int16 | R | 0-9999 W | | 2~4 | 1 |
| 105BH | 4187 | Real Power scale factor: SunSpec; | Sunssf | R | 0~4 | | 2~4 | 1 |
| 105CH | 4188 | AC Apparent Power VA: SunSpec; Total Apparent Power: AcuRev 1310 | Int16 | R | 0-9999 VA | | 2~4 | 1 |
| 105DH | 4189 | VA Phase A: SunSpec; Phase A Apparent Power: AcuRev 1310 | Int16 | R | 0-9999 VA | | 2~4 | 1 |
| 105EH | 4190 | VA Phase B: SunSpec; Phase B Apparent Power: AcuRev 1310 | Int16 | R | 0-9999 VA | | 2~4 | 1 |
| 105FH | 4191 | VA Phase C: SunSpec; Phase C Apparent Power: AcuRev 1310 | Int16 | R | 0-9999 VA | | 2~4 | 1 |
| 1060H | 4192 | Apparent Power scale factor: SunSpec; | Sunssf | R | 0~4 | | 2~4 | 1 |
| 1061H | 4193 | Reactive Power VAR: SunSpec; Total Reactive Power: AcuRev 1310 | Int16 | R | 0-9999 VAR | | 2~4 | 1 |
| 1062H | 4194 | VAR Phase A: SunSpec; Phase A Reactive Power: AcuRev 1310 | Int16 | R | 0-9999 VAR | | 2~4 | 1 |
| 1063H | 4195 | VAR Phase B: SunSpec; Phase B Reactive Power: AcuRev 1310 | Int16 | R | 0-9999 VAR | | 2~4 | 1 |
| 1064H | 4196 | VAR Phase C: SunSpec; Phase C Reactive Power: AcuRev 1310 | Int16 | R | 0-9999 VAR | | 2~4 | 1 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|-----------------|-----------|--|-----------|-----|-----------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1065H | 4197 | Reactive Power scale factor | Sunssf | R | 0~4 | | 2~4 | 1 |
| 1066H | 4198 | Power Factor | Int16 | R | -1000 ~ 1000 | | 2~4 | 1 |
| 1067H | 4199 | PF Phase A | Int16 | R | -1000 ~ 1000 | | 2~4 | 1 |
| 1068H | 4200 | PF Phase B | Int16 | R | -1000 ~ 1000 | | 2~4 | 1 |
| 1069H | 4201 | PF Phase C | Int16 | R | -1000 ~ 1000 | | 2~4 | 1 |
| 106AH | 4202 | Power Factor scale factor | Sunssf | R | -3 | | 2~4 | 1 |
| 106BH -106CH | 4203-4204 | Total Real Energy Exported: Sun-Spec Total Active Energy Exported: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 106DH -106EH | 4205-4206 | Total Watt-hours Exported in phase A: Sun-Spec; Total Active Energy Exported in Phase A: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 106FH -1070H | 4207-4208 | Total Watt-hours Exported in phase B: Sun-Spec; Total Active Energy Exported in Phase B: AcuRev 1300 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 1071H -1072H | 4209-4210 | Total Watt-hours Exported in Phase C: Sun-Spec; Total Active Energy Exported in Phase C: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 1073H -1074H | 4211-4212 | Total Real Energy Imported: Sun-Spec; Total Active Energy Imported: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 1075H -1076H | 4213-4214 | Total Watt-hours Imported Phase A: SunSpec; Total Active Energy Imported in Phase A: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|-----------------|-----------|--|-----------|-----|------------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1077H -1078H | 4215-4216 | Total Watt-hours Imported Phase B: SunSpec; Total Active Energy Imported in Phase B: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 1079H -107AH | 4217-4218 | Total Watt-hours Imported Phase C: SunSpec; Total Active Energy Imported in Phase C: AcuRev 1310 | Acc32 | R/W | 0-999999999 kWh | | 2~4 | 2 |
| 107B | 4219 | TotWh_SF: SunSpec; CT ratio X PT ratio: AcuRev 1310 | Sunssf | R | -3 ~ 0 | | 2~4 | 1 |
| 107CH -107DH | 4220-4221 | Total VA-hours Exported: SunSpec; Total Apparent Power Exported: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 3~4 | 2 |
| 107EH -17FH | 4222-4223 | Total VA-hours Exported Phase A: SunSpec; Total Apparent Power Exported in Phase A: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 3~4 | 2 |
| 1080H -1081H | 4224-4225 | Total VA-hours Exported Phase B: SunSpec; Total Apparent Power Exported in Phase A:A-cuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 3~4 | 2 |
| 1082H -1083H | 4226-4227 | Total VA-hours Exported phase C: SunSpec; Total Apparent Power Exported in Phase C: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 3~4 | 2 |
| 1084H -1085H | 4228-4229 | Total VA-hours Imported: SunSpec; Total Apparent Power Imported: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 2~4 | 2 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|-----------------|-----------|---|-----------|-----|--------------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1086H -1087H | 4230-4231 | Total VA-hours Imported phase A: SunSpec; Total Apparent Power Imported in Phase A: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 2~4 | 2 |
| 1088H -1089H | 4232-4233 | Total VA-hours Imported Phase B: SunSpec; Total Apparent Power Imported in Phase B: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 2~4 | 2 |
| 108AH -108BH | 4234-4235 | Total VA-hours Imported Phase C: SunSpec; Total Apparent Power Imported in Phase C: AcuRev 1310 | Acc32 | R/W | 0-999999999 kVAh | | 2~4 | 2 |
| 108CH | 4236 | Total VAh_SF: SunSpec; CT ratio X PT ratio: AcuRev 1310 | Sunssf | R | -3 ~ 0 | | 2~4 | 1 |
| 108DH -108EH | 4237-4238 | Total VAR-hours Imported Q1:SunSpec; | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 108FH -1090H | 4239-4240 | Total VAR-hours Imported Q1 Phase 1A | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 1091H -1092H | 4241-4242 | Total VAR-hours Imported Q1 Phase B | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 1093H -1094H | 4243-4244 | Total VAR-hors Imported Q1 Phase C | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 1095H -1096H | 4245-4246 | Total VAR-hours Imported Q2 Phase A | Acc32 | R/W | 0-99k9999999 kvarh | | 2~4 | 2 |
| 1097H -1098H | 4247-4248 | Total VAR-hours Imported Q2 Phase A | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 1099H -109AH | 4249-4250 | Total VAR-hours Imported Q2 Phase B | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 109BH -109CH | 4251-4252 | Total VAR-hours Imported Q2 Phase C | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|-----------------|-----------|--|------------|-----|--------------------------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 109DH -109EH | 4253-4254 | Total VAR-hours Exported Q3 | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 109FH -10AH | 4255-4256 | Total VAR-hours Exported Q3 Phase A | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10A1H -10A2H | 4257-4258 | Total VAR-hours Exported Q3 Phase B | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10A3H -10A4H | 4259-4260 | Total VAR-hours Exported Q3 Phase C | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10A5H -10A6H | 4261-4262 | Total VAR-hours Exported Q4 | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10A7H -10A8H | 4263-4264 | Total VAR-hours Exported Q4 Phase A | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10A9H -10AAH | 4265-4266 | Total VAR-hours Exported Q4 Phase B | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10ABH -10ACH | 4267-4268 | Total VAR-hours Exported Q4 Phase C | Acc32 | R/W | 0-999999999 kvarh | | 2~4 | 2 |
| 10ADH | 4269 | Total VARh_SF: SunSpec; CT ratio X PT ratio: AcuRev 1310 | Sussf | R | All the energy use the same SF | | 2~4 | 1 |
| 10AEH -10AFH | 4270-4271 | Meter Evenet-Flags | Bitfield32 | R | 0 | 0 | 2~4 | 2 |
| 10B0H | 4272 | SunSpec_end_ID: SunSpec; | UInt16 | | 0xFFFF | | 2~4 | 1 |
| 10B1H | 4273 | SunSpec_end_length: SunSpec | UInt16 | | 0x0000 | | 2~4 | 1 |

Table 5-21 Current Maximum demand and time of occurrence address

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|---|-----------|---------------------------------|-----------|-----|---------------------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| Current maximum demand and time of occurrence data | | | | | | | | |
| 1600H-1601H | 5632-5633 | Input active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1602H-1604H | 5634-5636 | total max demand and occur time | Dword | | (Second always be 0) | | | 3 |
| 1605H-1606H | 5637-5638 | Input active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1607H-1609H | 5639-5641 | max demand 1 and occur time | Dword | | | | | 3 |
| 160AH-160BH | 5642-5643 | Input active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 160CH-160EH | 5644-5646 | max demand 2 and occur time | Dword | | | | | 3 |
| 160FH-1600H | 5647-5648 | Input active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1611H-1613H | 5649-5651 | max demand 3 and occur time | Dword | | | | | 3 |
| 1614H-1615H | 5652-5653 | Input active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1616H-1618H | 5654-5656 | max demand 4 and occur time | Dword | | | | | 3 |
| 1619H-161AH | 5657-5658 | Output active powers | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 161BH-161DH | 5659-5661 | total max demand and occur time | Dword | | | | | 3 |
| 161EH-161FH | 5662-5663 | Output active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1620H-1622H | 5664-5666 | max demand 1 and occur time | DWORD | | | | | 3 |
| 1623H-1624H | 5667-5668 | Output active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 1625H-1627H | 5669-5671 | max demand 2 and occur time | Dword | | | | | 3 |
| 1628H-1629H | 5672-5673 | Output active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 162AH-162C | 5674-5676 | max demand 3 and occur time | Dword | | | | | 3 |
| 162DH-162EH | 5677-5678 | Output active power | Float | R | xx.xxxx kW YYMMDDhhmmss | | 3,4 | 2 |
| 162FH-1631H | 5679-5681 | max demand 4 and occur time | Dword | | | | | 3 |
| 1632H-1633H | 5682-5683 | Input reactive power | Float | R | xx.xxxx kvar YYMMDDhhmmss | | 3,4 | 2 |
| 1634H-1636H | 5684-5686 | max demand 1 and occur time | Dword | | | | | 3 |
| 1637H-1638H | 5687-5688 | Input reactive power | Float | R | xx.xxxx kvar YYMMDDhhmmss | | 3,4 | 2 |
| 1639H-163BH | 5689-5691 | max demand 1 and occur time | Dword | | | | | 3 |
| 163CH-163DH | 5692-5693 | Input reactive power | Float | R | xx.xxxx kvar YYMMDDhhmmss | | 3,4 | 2 |
| 163EH-1640H | 5694-5696 | max demand 2 and occur time | Dword | | | | | 3 |
| 1641H-1642H | 5697-5698 | Input reactive power | Float | R | xx.xxxx kvar YYMMDDhhmmss | | 3,4 | 2 |
| 1643H-1645H | 5699-5701 | max demand 3 and occur time | Dword | | | | | 3 |
| 1646H-1647H | 5702-5703 | Input reactive power | Float | R | xx.xxxx kvar YYMMDDhhmmss | | 3,4 | 2 |
| 1648H-164AH | 5704-5706 | max demand 4 and occur time | Dword | | | | | 3 |

| MODBUS Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|----------------------------|------------------------|---|----------------|-----|----------------------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 164BH-164CH 164DH-164FH | 5707-5708 5709-5711 | Output reactive powers total max demand and occur | Float Dword | R | xx.xxxx kvar YYM-MDDhhmmss | | 3,4 | 2 3 |
| 1650H-1651H 1652H-1654H | 5712-5713 5714-5715 | Output reactive power max demand 1 and occur time | Float Dword | R | xx.xxxx kvar YYM-MDDhhmmss | | 3,4 | 2 3 |
| 1655H-1656H 1657H-1659H | 5718-5720 5716-5717 | Output reactive power max demand 2 and occur time | Float Dword | R | xx.xxxx kvar YYMMDhhmmss | | 3,4 | 2 3 |
| 165AH-165BH 165CH-165EH | 5721-5722 5723-5725 | Output reactive power max demand 3 and occur time | Float Dword | R | xx.xxxx kvar YYMMDhhmmss | | 3,4 | 2 3 |
| 165FH-1660H 1661H-1663H | 5726-5727 5728-5730 | Output reactive power max demand 4 and occur time | Float Dword | R | xx.xxxx kvar YYM-MDDhhmmss | | 3,4 | 2 3 |
| 1664H-1665H 1666H-1668H | 5731-5732 5733-5735 | Apparent power total max demand and occur time | Float Dword | R | xx.xxxx kVA YYMMD-Dhhmmss | | 3,4 | 2 3 |
| 1669H-166AH 166BH-166DH | 5736-5737 5738-5740 | Phase A current max demand and occur time | Float Dword | R | xx.xxxx A YYMMD-Dhhmmss | | 3,4 | 2 3 |
| 166EH-166FH 1670H-1672H | 5741-5742 5743-5744 | Phase B current max demand and occur time | Float Dword | R | xx.xxxx A YYMMD-Dhhmmss | | 3,4 | 2 3 |
| 1673H-1674H 1675H-1677H | 5745-5746 5747-5748 | Phase C current max demand and occur time | Float Dword | R | xx.xxxx A YYMMD-Dhhmmss | | 3,4 | 2 3 |
| 1678H-1690H | 5749-5776 | Reserved | | | | | | |

Event logging (03H: read)

Table 5-22 Event Logging

| MODBUS Address | | Parameter Description | Data Type | R/W | 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 | 74266-7428 | 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 5-23 Programming record address

| Modbus Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|--|-----------|------------------------|-----------|-----|-------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1A00H-1A01H | 6656-6657 | Total programming time | Dword | R | 0-999999 | | 2-4 | 2 |
| Last Event Reset Record | | | | | | | | |
| 1A02H-1A04H | 6658-6660 | Occur time | Word | R | YYMMDDhmmss | | 2-4 | 3 |
| Last 2nd Event Reset Record | | | | | | | | |
| 1A06H-1A0DH | 6662-6669 | | | | | | 2-4 | 8 |
| <p>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</p> | | | | | | | | |

Demand Clearance Event

Table 5-24 Demand Clearance Address

| Modbus Address | | Parameter Description | Data Type | R/W | 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 open cover record | | | | | | | | |
| 1B02H-1B04H | 6914-6916 | Occur time | Word | R | YYMMDDhmmss | | 2-4 | 3 |
| Last 2nd - 3rd time | | | | | | | | |
| 1B05H-1B0AH | 6917-6916 | | | | | | 2-4 | 6 |

Open Cover Record

Table 5-25 Open Cover Record Address

| Modbus Address | | Parameter Description | Data Type | R/W | 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 | Y Y M M D - Dhhmmss | | 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 5-26 Event Clearance Address

| Modbus Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|--|-----------|----------------------------|-----------|-----|--|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1D00H-1D01H | 7424-7425 | Total event clearance time | Word | R | | | 2-4 | 2 |
| Last time open cover 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 5-27 Meter Clearance Address

| Modbus Address | | Parameter Description | Data Type | R/W | Range | Default | Model | Register Number |
|---|-----------|----------------------------|-----------|-----|--------------|---------|-------|-----------------|
| Hex | Decimal | | | | | | | |
| 1E00H-1E01H | 7680-7681 | Total meter clearance time | Word | R | 0-999999 | | 2-4 | 2 |
| Last time meter cleared record | | | | | | | | |
| 1E02H-1E04H | 7682-7684 | Occur time | Word | R | YYMMDDhhmmss | | 2-4 | 3 |
| Last 2 nd – 3 rd time | | | | | | | | |
| 1E05H-1E0AH | 7685-7690 | | | | | | 2-4 | 6 |

RO Control Function (01H read, 05H write)

RO state read (01H)

Table 5-28 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 5-29 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 |

AcuRev 1310 DIN-Rail Power Meter

Appendix

Appendix A - Functions List

Appendix B - Technical Data and Specification

Appendix C - Revision History

Appendix D - Alarm Parameters Comparison Table

Appendix E - Meter Event Flags: 32 bit

Appendix A – Functions List

| Function | AcuRev 1311 | AcuRev 1312 | AcuRev 1313 | AcuRev1314 |
|------------------------------------|-------------|-------------|-------------|------------|
| 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 | | ■ | ■ | ■ |
| Apparent Power | | ■ | ■ | ■ |
| Power Factor | | ■ | ■ | ■ |
| Frequency | | ■ | ■ | ■ |
| Clock | | ■ | ■ | ■ |
| Running Time | ■ | ■ | ■ | ■ |
| Energy Pulse Output | ■ | ■ | ■ | ■ |
| Alarm Output | | ■ | ■ | ■ |
| Alarm Event | | ■ | ■ | ■ |
| Relay Output | | ⊖ | ⊖ | ⊖ |
| RS-485 Modbus-RTU | | ■ | ■ | ■ |
| Wiring Check | ■ | ■ | ■ | ■ |
| Temperature | ■ | ■ | ■ | ■ |

■ : Fixed function

⊖ : Optional function

Blank: Function Not Supported

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 Output | |
|-------------------|--|
| Load Voltage | 250Vac 30Vdc |
| Max Load Current | 5A (Resistive Load) |
| Isolation Voltage | 2000Vac(1min) |
| Action Time | 10ms |
| Mechanical Life | 20 million times |
| Electrical Life | Above 50,000 times (5A, 250Vac, Resistive Load) |

| Communication | |
|------------------------|----------------------|
| RS485 Baud 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 Revision History

| Version | Date | Description |
|---------|----------|----------------|
| V2.01 | 20141021 | First Version |
| V2.02 | 20150923 | Second Version |
| V2.03 | 20170910 | Third Version |

Appendix D Alarm Parameters Comparison Table

| Set Value | Corresponding Parameter | Set Value | Corresponding Parameter | Set Value | Corresponding Parameter |
|-----------|-------------------------|-----------|-------------------------|-----------|-------------------------|
| 0 | Total Current | 1 | Phase current A | 2 | Phase Current B |
| 3 | Phase Current C | 4 | Phase Average Voltage | 5 | Phase Voltage A |
| 6 | Phase Voltage B | 7 | Phase Voltage C | 8 | Line Average Voltage |
| 9 | Line AB Voltage | 10 | Line BC Voltage | 11 | Line CA Voltage |
| 12 | Frequency | 13 | Total Active Power | 14 | Phase A Active Power |
| 15 | Phase B Active Power | 16 | Phase C Active Power | 17 | Total Apparent Power |
| 18 | Phase A Apparent Power | 19 | Phase B Apparent Power | 20 | Phase C Apparent Power |
| 21 | Total Reactive Power | 22 | Phase A Reactive Power | 23 | Phase B Reactive Power |
| 24 | Phase C Reactive Power | 25 | Total Power Factor | 26 | Phase A Power Factor |
| 27 | Phase B Power Factor | 28 | Phase C Power Factor | | |

Appendix E Meter Event Flags: bit32

| | | | | | | | |
|------------------------|----------------------|----------------------|----------------|-----------------------|-----------------------|----------|----------|
| Bit31 | Bit30 | Bit29 | Bit28 | Bit27 | Bit26 | Bit25 | Bit24 |
| Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |
| Bit23 | Bit22 | Bit21 | Bit20 | Bit19 | Bit18 | Bit17 | Bit16 |
| Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |
| Bit15 | Bit14 | Bit13 | Bit12 | Bit11 | Bit10 | Bit9 | Bit8 |
| Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |
| Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
| M_EVENT_Missing_Sensor | M_EVENT_Over_Voltage | M_EVENT_Over_Current | M_EVENT_Low_PF | M_EVENT_Under_Voltage | M_EVENT_Power_Failure | Reserved | Reserved |

ЭНЕРГОМЕТРИКА
www.energometrika.ru

Адрес: Москва, м. Авиамоторная, пр-д Завода Серп и Молот, д. 6, офис 408
Телефон: +7 495 510-1104
Web: www.energometrika.ru
e-mail: zakaz@energometrika.ru