



Acuvim-L Multifunction Power and Energy Meter User's Manual



ACCUENERGY

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Please read this manual carefully before installation, operation, and maintenance of Acuvim-L power meter.

The following symbols in this manual and on Acuvim-L series meters 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.**

 **This mark indicates that this product is UL Listed.**

Installation and maintenance of the Acuvim-L power meter should only be performed by qualified, competent professionals who have received training and experience with high voltage and current devices.

Accuenergy shall not be responsible or liable for any damages caused by improper meter installation and/or operation.

Congratulations!

You have purchased an advanced, versatile, multifunction power meter. This meter can work as a remote terminal unit (RTU) that contributes to your system's stability and reliability by providing real-time power quality monitoring and analysis. When you open the package, you will find the following items:

- | | |
|------------------------------|----------------------------|
| 1. Acuvim-L power meter | qty: 1 |
| 2. Terminal Blocks | qty: 3 (2 for basic model) |
| 3. Installation Clips | qty: 4 |
| 4. Additional documentation: | qty: 2 |
| a. Quick Setup Guide, | |
| b. Calibration Certificate | |

To avoid complications, please read this manual carefully before installation and operation of the Acuvim L series meter.

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Chapter 1: Introduction

1.1 Functionality

Multifunction, High Accuracy Measurements

Acuvim-L series three-phase, multifunction power meter built on the advanced microprocessor and high-precision ADC technology platform that uses with digital signal processing to measure and analyze voltage, current, active, reactive, apparent power, and energy. Extended digital outputs and an RS485 communication interface can output pulse energy, event alarms, remote data collection values, and control functions. The Acuvim-L series meter combines superior performance and high accuracy measurements with an affordable price point.

Compact and Easy to Install

Acuvim-L series meter can be installed into a standard ANSI C39.1 (4" round) or an IEC 92mm DIN (square) slot. With the 51 mm depth, the meter can be installed in a small cabinet or enclosure. Installation clips are provided for easy installation and removal.

Easy to Use

The Acuvim-L features a large LCD screen with a bright backlight ideal for low lighting conditions. The interface permits easy access to measured data and meter settings by using the front panel keys or communication port. All settings are stored in non-volatile, EEPROM memory and are saved even when the meter is powered down.

Meets all Safety and Reliability Standards

Acuvim-L series meter was designed according to industrial standards. It can reliably run under high power disturbance conditions and, additionally, it has been fully tested for EMC and safety compliance in accordance with UL and IEC standards.

1.2 Application Area

Acuvim-L series can be used as front-end power automation system Acquisition Terminal (RTU) for remote data acquisition and control. It can also be used as a multifunction power measuring instrument in a power distribution system or a wide range of other applications. The Acuvim-L uses advanced true RMS measuring and digital signal processing technology for accurate monitoring of the power quality of non-linear loads, even in harsh environments.

- Power distribution automation
- Industrial automation
- Energy management systems
- Electric switch gear and control panels
- Building automation
- Marine applications

1.3 Meter Overview

The Acuvim-L series has three standard models: Acuvim-BL (basic model + DO), Acuvim-CL (basic model + communication + extension), and Acuvim- EL (sharing power + communication + extension). Please see table 1-1 for their functionalities and details.

Table 1-1 Functions of Acuvim-L Series

| Function | | Parameters | BL | CL | EL |
|---------------------|--|--|----|----|----|
| Real Time Measuring | Phase Voltage | U1, U2, U3, Ulnavg | • | • | • |
| | Line Voltage | U12, U23, U31, Ullavg | • | • | • |
| | Current | I1, I2, I3, In, lavg, Itotal | • | • | • |
| | Power | P1, P2, P3, Psum | • | • | • |
| | Reactive Power | Q1, Q2, Q3, Qsum | • | • | • |
| | Apparent Power | S1, S2, S3, Ssum | • | • | • |
| | Power Factor | PF1, PF2, PF3, PF | • | • | • |
| | Load Nature | L/C/R | • | • | • |
| | Frequency | F Hz | • | • | • |
| Energy | Active Energy | Ep_imp, Ep_exp, Ep_total, Ep_net, Ep_q1, Ep_q2, Ep_q3, Ep_q4 | • | • | • |
| | Reactive Energy | Eq_imp, Eq_exp, Eq_total, Eq_net, Eq_q1, Eq_q2, Eq_q3, Eq_q4 | • | • | • |
| | Apparent Energy | Es_imp, Es_exp, Es_total, Es_net, Es_q1, Es_q2, Es_q3, Es_q4 | • | • | • |
| | Single-Phase Active Energy | Epa_imp, Epa_exp, Epb_imp, Epb_exp, Epc_imp, Epc_exp | | • | • |
| | Single-Phase Reactive Energy | Eqa_imp, Eqa_exp, Eqb_imp, Eqb_exp, Eqc_imp, Eqc_exp | | • | • |
| | Single-Phase Apparent Energy | Esa_imp, Esa_exp, Esb_imp, Esb_exp, Esc_imp, Esc_exp | | • | • |
| | Daily Energy | Active Energy, Reactive Energy and Apparent Energy | • | • | • |
| Demand | Current Demand, Current Predicted Demand | Dmd_I1, Dmd_I2, Dmd_I3, Dmd_In, Dmd_Ia_Pre, Dmd_Ib_Pre, Dmd_Ic_Pre, Dmd_In_Pre | • | • | • |
| | Power Demand, Power Predicted Demand | Dmd_Psum, Dmd_Qsum, Dmd_Ssum, Dmd_Psum_Pre, Dmd_Qsum_Pre, Dmd_Ssum_Pre | • | • | • |
| Time | Real Time Clock | Year, Month, Day, Hour, Minute, Second | • | • | • |
| Hour | Meter Running Time | Hour | • | • | • |
| | Load Running Time | Hour | • | • | • |
| Wiring Check | Voltage/Current Wiring | Each phase of V & I loss or error | • | • | • |

| Function | | Parameters | BL | CL | EL | |
|-----------------------------|--|---|----|----|----|---|
| Power Quality | Voltage Unbalance | U_unbl | ● | ● | ● | |
| | Current Unbalance | I_unbl | ● | ● | ● | |
| | Voltage THD | THD_V1, THD_V2, THD_V3 | ● | ● | ● | |
| | Current THD | THD_I1, THD_I2, THD_I3, THD_IN | ● | ● | ● | |
| | Individual Harmonics | Harmonics 2nd to 31st | | ● | ● | |
| | | Harmonics 2nd to 63rd | | | | ● |
| | Voltage Crest Factor | Crest Factor | ● | ● | ● | |
| | TIF | THFF | ● | ● | ● | |
| Current K Factor | K Factor | ● | ● | ● | | |
| Sequence | Voltage/Current Sequence | Positive Sequence, Negative Sequence, Zero Sequence | | ● | ● | |
| Phase Angles | Voltage/Current Phase Angles | Voltage Phase Angle, Current Phase Angle | ● | ● | ● | |
| Statistics | MAX with Time Stamp, MIN with Time Stamp | Each phase of V & I; Total of P, Q, S, PF & F; Demand of I1, I2, I3, IN, P, Q&S; Each phase THD of V & I; Unbalance factor of V & I | ● | ● | ● | |
| Alarm | Over/Under Limit Alarm | V, I, P, Q, S, PF, V_THD & I_THD Each Phase and Total or Average; Unbalance Factor of V& I; Load Type; Demand of I1, I2, I3, P, Q & S; Reverse phase sequence; | ● | ● | ● | |
| Power Quality Event Logging | Power Quality Event with Time Stamp | Voltage SAG and fail, Current overflow, Phase Sequence error | | | ● | |
| Time of Use | Energy/Max Demand | TOU, 4 Tariffs, 12 Seasons, 14 Schedules | | | ● | |
| | Daylight Saving Time | Two Adjustable Formats | | | ● | |
| | Holiday | Holiday setting up to 10 years | | | ● | |
| I/O | Energy Pulse Output | 2 DO, configured as pulse output for kWh and kVarh, the pulse rate and width can be set | ● | | | |
| | IO Module | 4DI, 2DO/2RO, SOE, Pulse Counter, Pulse output, Alarm output | | ⊙ | ⊙ | |
| Communication | RS-485 | Modbus [®] -RTU Protocol | | ● | ● | |
| | Ethernet | Modbus [®] -TCP, HTTP, SMTP, SNMP | | | | |
| | RS-485 Module | Modbus [®] -RTU Protocol | | ⊙ | ⊙ | |
| | PROFIBUS | PROFIBUS-DP/V0 Protocol | | ⊙ | ⊙ | |
| Display | LCD or DIN Rail | | ⊙ | ⊙ | ⊙ | |
| Dimensions | 96×96×64.3mm (Opening Size: 92 × 92mm) | | | | | |

Note: ● Possessed functions ⊙ Optional function Blank NA

BL/CL models imbalance using sequence components algorithms; EL model features an amplitude algorithm.

Chapter 2: Installation

Considerations When Installing Meters

- Installation of the meter must only be performed by qualified personnel who follow standard safety precautions throughout the installation procedure. Those personnel should have appropriate training and experience with high voltage devices. Appropriate safety gloves, safety glasses, and protective clothing are recommended.
- During normal operation, dangerous voltage may flow through many parts of the meter, including terminals, any connected CTs (Current Transformers) or PTs (Potential Transformers), and all I/O (Inputs and Outputs) modules and their circuits. All primary and secondary circuits can, at times, produce lethal voltages and currents. AVOID contact with any current-carrying surfaces.
- The meter and its I/O output channels are NOT designed as primary protection devices and shall NOT be used as primary circuit protection or in an energy-limiting capacity. The meter and its I/O output channels can only be used as secondary protection. AVOID using the meter under situations where failure of the meter may cause injury or death. AVOID using the meter for any application where risk of fire may occur.
- All meter terminals should be inaccessible after installation.
- Do NOT perform Dielectric (HIPOT) test to any inputs, outputs, or communication terminals. High voltage testing may damage the electronic components of the meter.
- Applying more than the maximum voltage the meter and/or its modules can withstand will permanently damage the meter and/or its modules. Please refer to the specifications for all devices before applying voltages.
- When removing meter for service, use shorting blocks and fuses for the voltage leads and the power supply to prevent hazardous voltage conditions or damage to CTs. CT grounding is optional.
- Accuenergy recommends using a dry cloth to wipe the meter.



NOTE: IF THE EQUIPMENT IS USED IN A MANNER NOT SPECIFIED BY THE MANUFACTURER, THE PROTECTION PROVIDED BY THE EQUIPMENT MAY BE IMPAIRED.



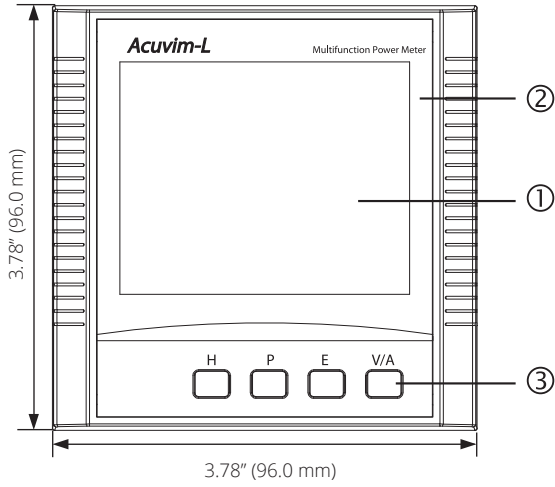
NOTE: THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.

DISCONNECT DEVICE: The following part is considered the equipment disconnect device.

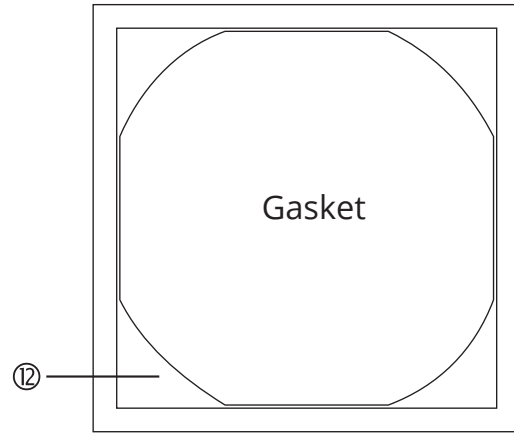
A Switch Or Circuit-Breaker Shall Be Included In The Installation. The Switch Shall Be In Close Proximity To The Equipment And Within Easy Reach Of The Operator. The Switch Shall Be Marked As The Disconnecting Device For The Equipment.

The installation method is introduced in this chapter. Please read this chapter carefully before beginning the installation process.

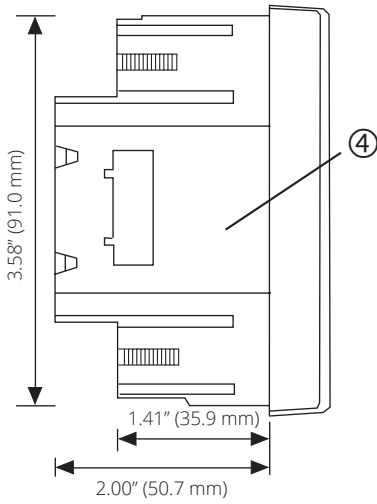
2.1 Appearance and Dimensions



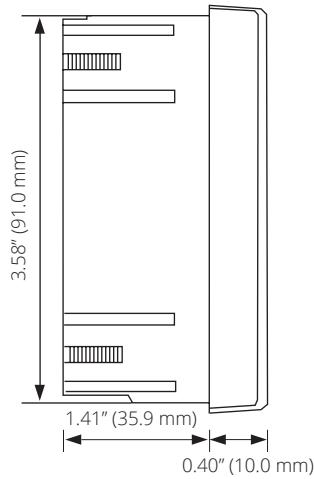
Front View of the Display Meter and Remote Display Unit



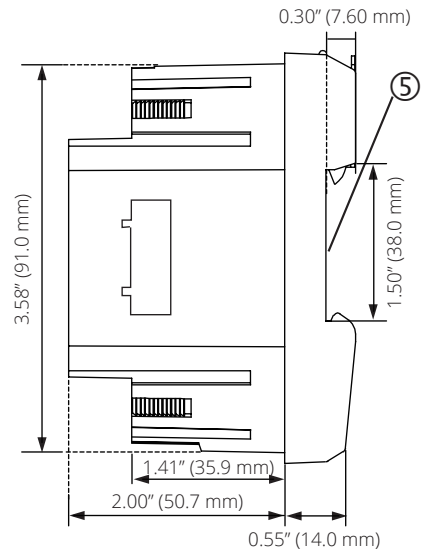
Gasket



Side View of the Display Meter



Side View of the Remote Display Unit



Side View of the DIN rail Meter

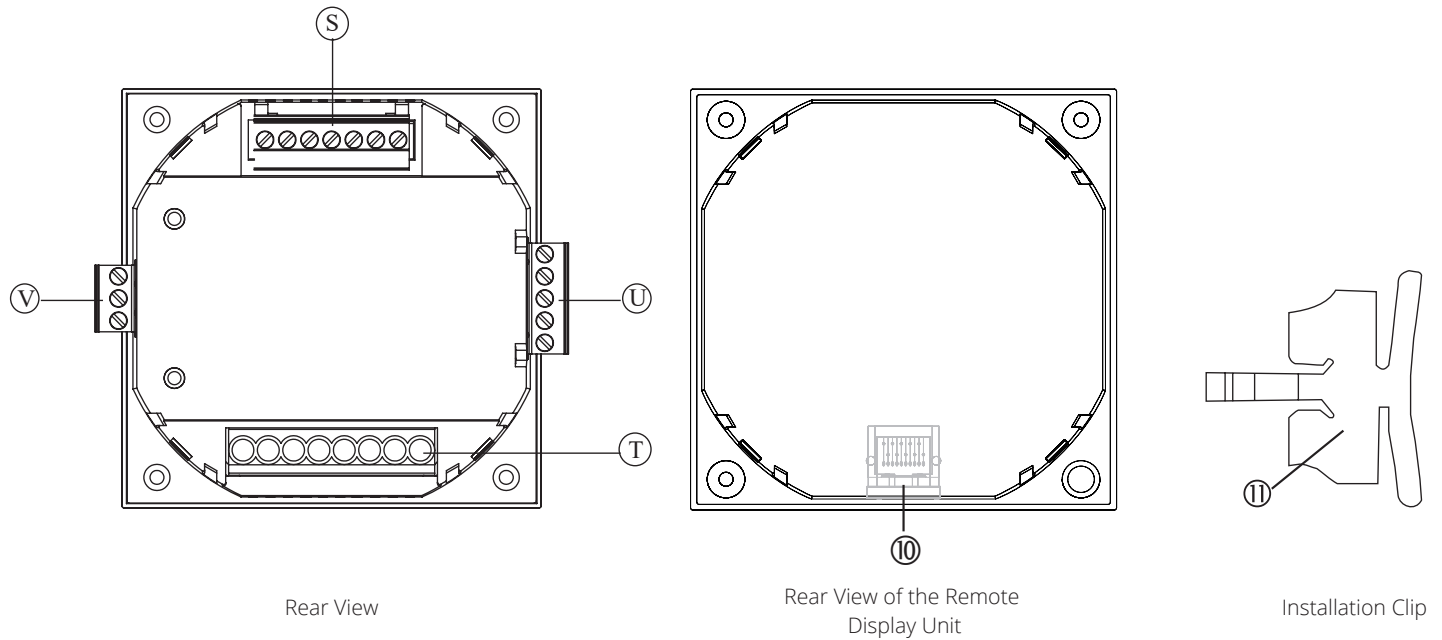


Fig 2-1 Appearance and Dimensions

| Part Name | Description |
|----------------------------|--|
| 1. LCD Display | Large bright white backlight LCD display. |
| 2. Front Casing | Visible portion (for display and control) after mounting onto a panel. |
| 3. Key | Four keys are used to select display and set. |
| 4. Enclosure | The Acuvim L series meter enclosure is made of high strength anti-combustible engineering plastic. |
| 5. DIN rail | Used for Installation 35mm rail of the DIN rail Meter. |
| 6. Voltage Input Terminals | Used for voltage input. |
| 7. Current Input Terminals | Used for current input. |
| 8. Power Supply Terminals | Used for auxiliary power supply input. |
| 9. Communication Terminals | Communication output. |
| 10. Interface | Used to link the remote display unit to the DIN rail meter. |
| 11. Installation Clip | Used for fixing the meter to the panel. |
| 12. Gasket | Insert the gasket in between the meter and the cutout to cover up gaps from the round hole. |

I/O module appearance and mechanical dimensions:

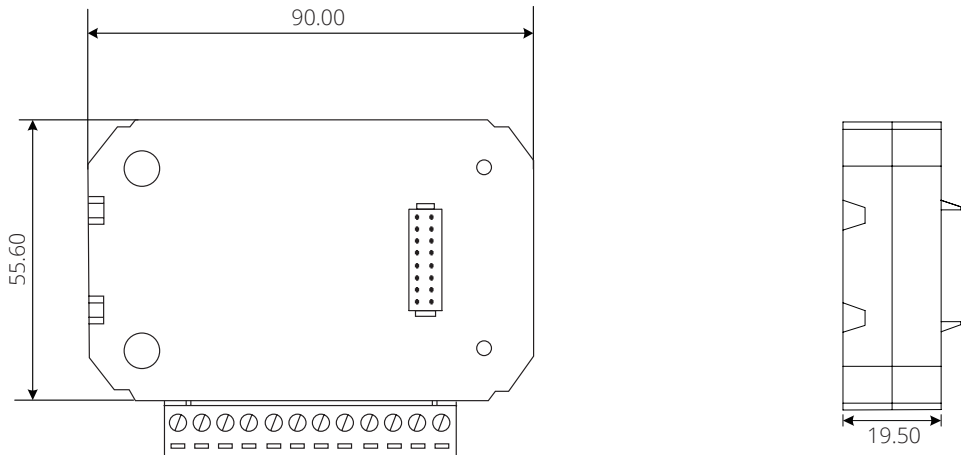


Fig 2-2 Structure Configuration of I/O Modules

PROFIBUS module appearance and mechanical dimensions:

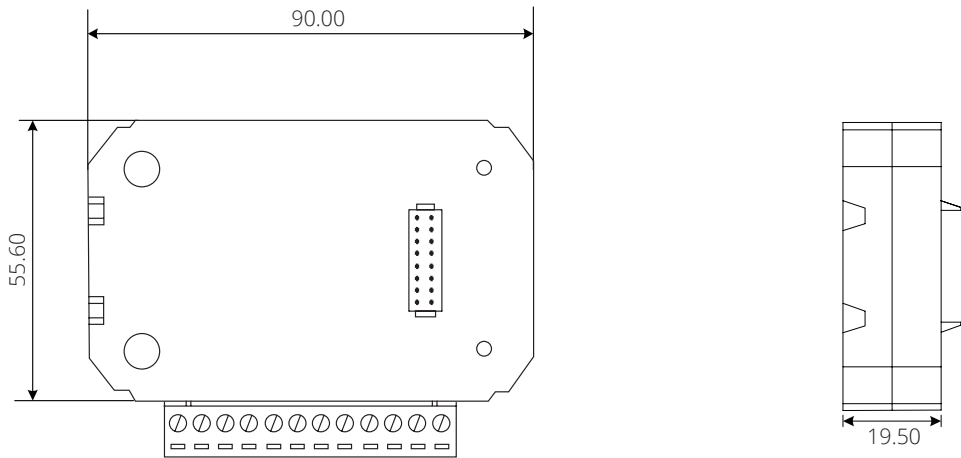


Fig 2-3 Structure Configuration of PROFIBUS Modules

2.2 Installation Methods

Installation Environment



Note: Temperature and humidity of the environment must be in accordance with the requirements of the Acuvim-L. Operating the meter outside the specified environmental range may cause irreparable damage to the meter.

Please check the environmental temperature and humidity according to Acuvim-L's specifications to ensure the power meter will properly operate.

1. Temperature Range:

- Operation: -25°C to 70°C
- Storage: -40°C to 85°C

2. Humidity: 5% to 95% non-condensing

3. Location: Acuvim-L power meter should be installed in a dry and dust-free environment. Avoid exposing the meter to excessive heat, radiation, or sources of electrical noise.

Installation Steps

Acuvim-L series meter can be installed into a standard ANSI C39.1 (4" round) or an IEC 92mm DIN (square) form.

1. Cut a square or round hole on the panel of the switch gear. The cut-out size is shown in Fig 2-4.

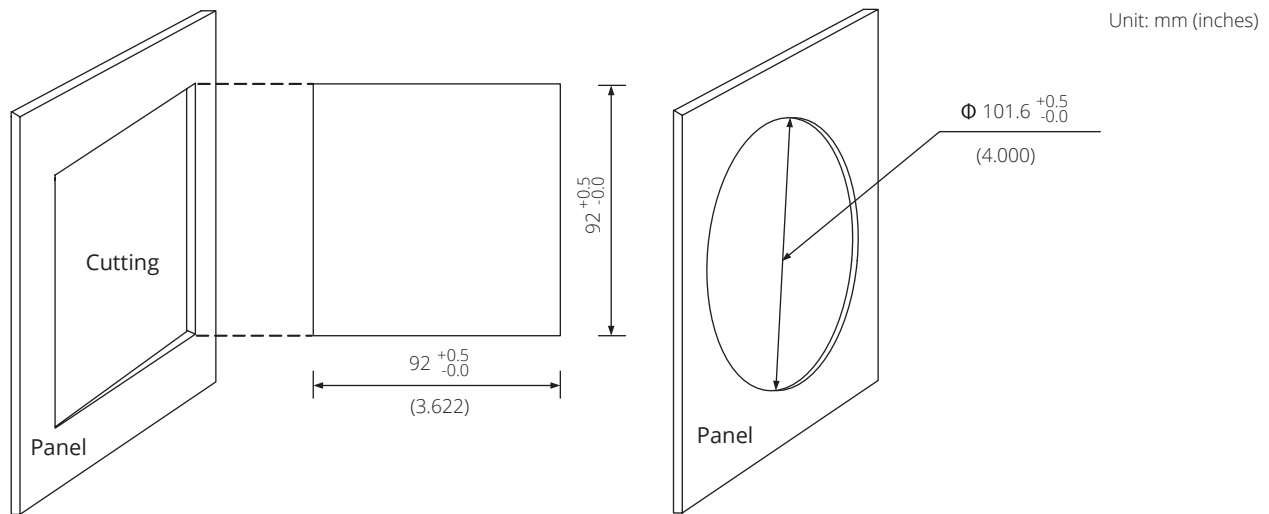


Fig 2-4 Panel Cutting

2. Remove the clips from the meter and put the Acuvim-L into the square hole from the front side.

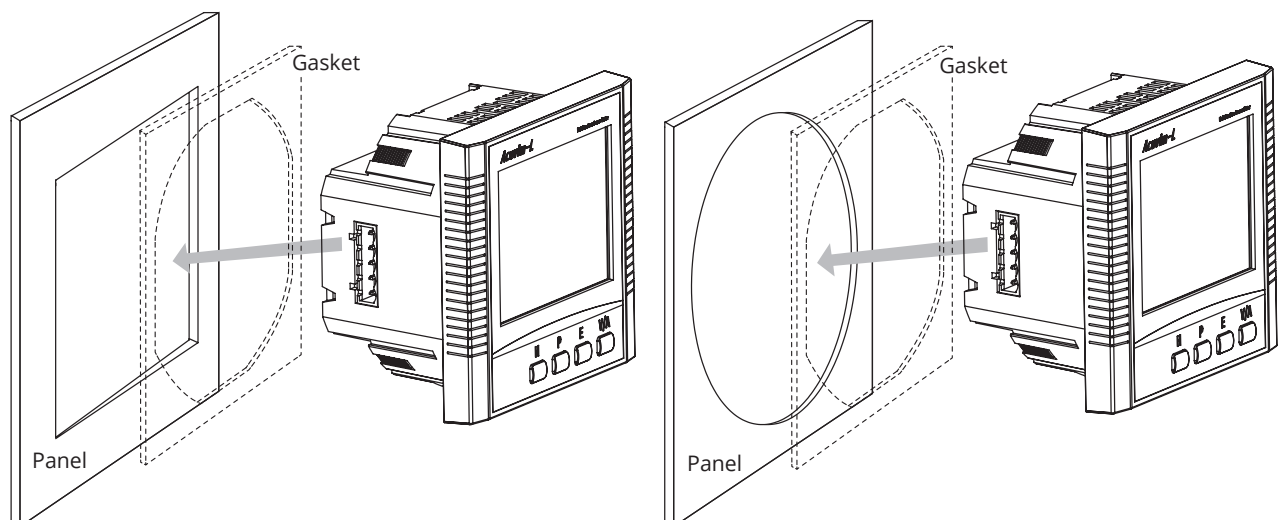


Fig 2-5 Put the Meter into the Square

3. Install the clips to the meter from backside and push the clips tightly so that the meter is fixed on the panel.

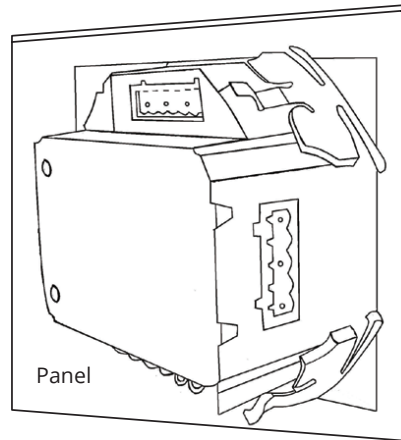


Fig 2-6 Use Clips to Fix the Meter

Module Installation:

Note: Acuvim-CL and Acuvim-EL Power meter can connect to, at most, one I/O module, and one Ethernet module or one PROFIBUS module at the same time.

1. The module can be installed from the bottom of the meter.
2. The module is affixed to the meter by the screw.
3. Please install the PROFIBUS module first if both an I/O and PROFIBUS module are selected.
4. Please install the Ethernet module first if both an I/O and Ethernet module are selected.

Removal Steps:

Unscrew the fixing screws and lightly pull the expansion module so that the pin and socket separate., The clip of the extension module can now be from the clamp mouth of Acuvim-CL/EL meter.

Note:

1. It is easy to damage the clamp extension, Installation and removal should be done with a light tap or pull to avoid damage.
2. DANGER: Never install or remove expansion modules while the meter is powered.

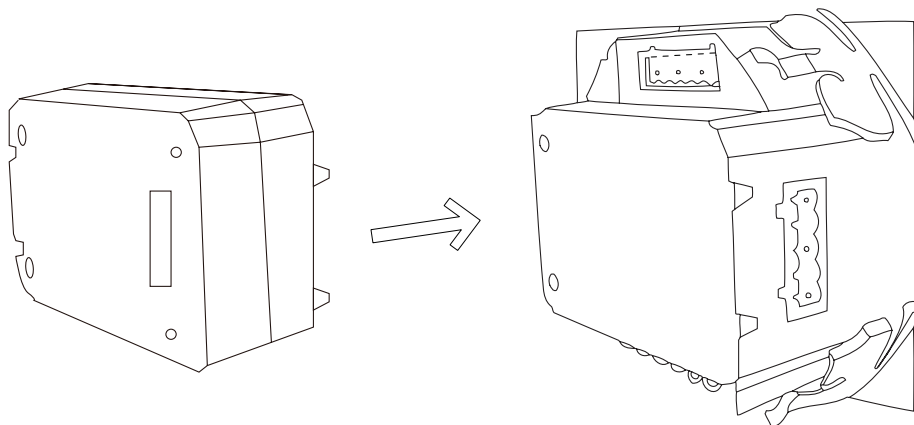


Fig 2-7 I/O Installation Diagram

2.3 Wiring

2.3.1 Terminal Strips

There are four terminal strips at the back of the Acuvim-L series meter, depending on model. The terminal strip diagrams are shown below. The three-phase voltage and current are represented by using 1, 2, and 3 respectively. These numbers have the same meaning as A, B, and C or R, S, and T used in other literature.

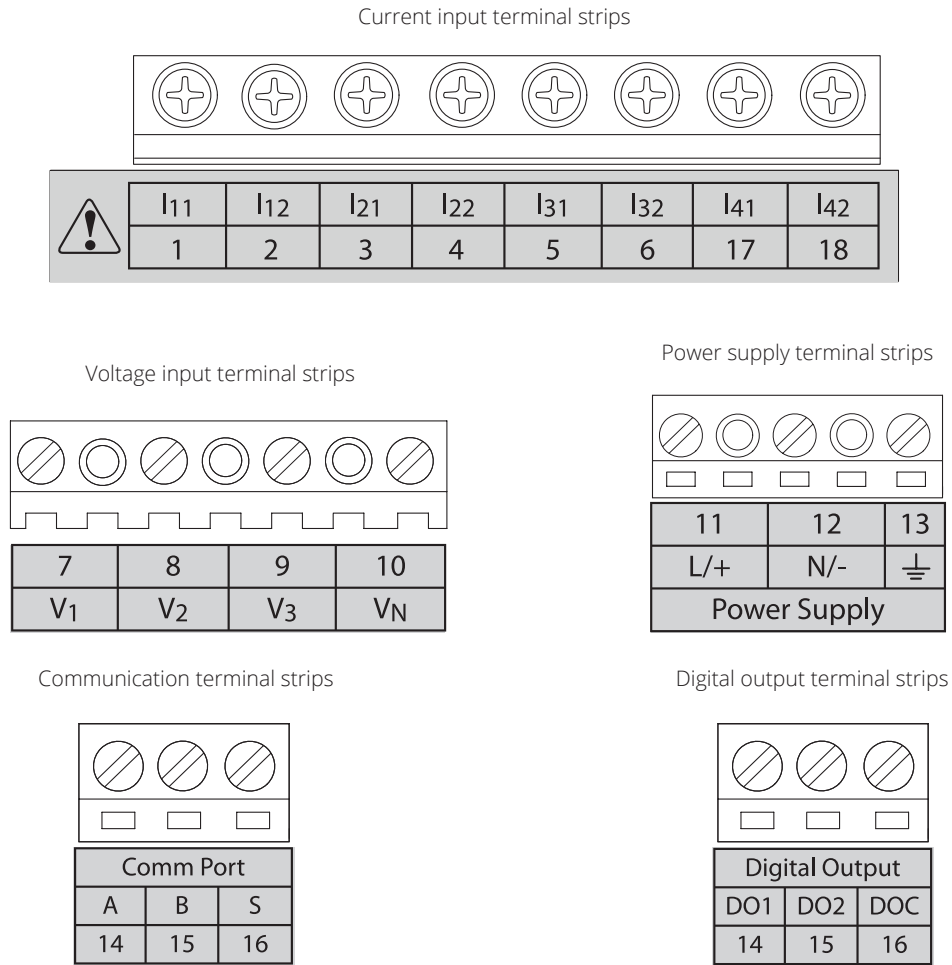


Fig 2-8 Terminal Diagram of Acuvim-L

Note: Acuvim-BL has a digital output terminal strip. The Acuvim-CL/EL have a communication terminal strip.

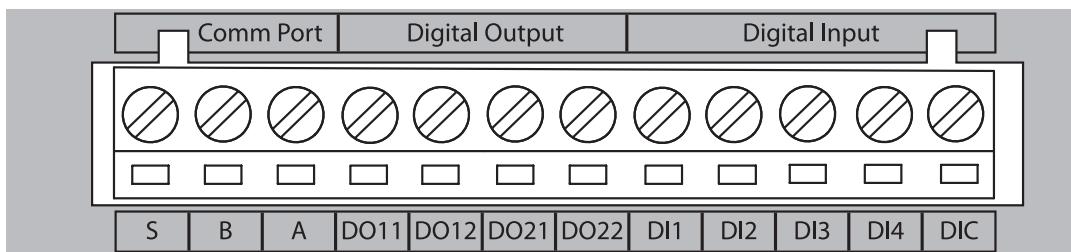


Fig 2-9 Expansion Module Terminal Description



Danger! Only qualified personnel should perform wiring connections. Make sure the power supply is disconnected. Failure to follow these instructions may result in severe injury or death.

Safety Earth Connection

Before setting up the meter's wiring, please make sure that the switch gear has an earth ground terminal. Connect both the meter and the switch gear ground terminals together. The following ground terminal symbol is used in this user's manual.



Fig 2-10 Safety Earth Symbol

2.3.2 Power Requirement

Note: Make sure the power supply voltage is within the required auxiliary power supply range.

Auxiliary Power

There are two Auxiliary Power Supply options for the Acuvim-L series meter:

1. Standard: 100~415Vac (50/60Hz) or 100~300Vdc
2. Low Voltage DC Option: 20~60Vdc

Choose the option according to the application.

The meter's typical power consumption is very low and can be supplied by an independent source or by the measured load line. A regulator or an uninterruptible power supply (UPS) should be used under high power fluctuation conditions. Terminals for the auxiliary power supply are 11, 12, 13 (L, N, G).

The typical wiring connection is shown as Fig 2-11.

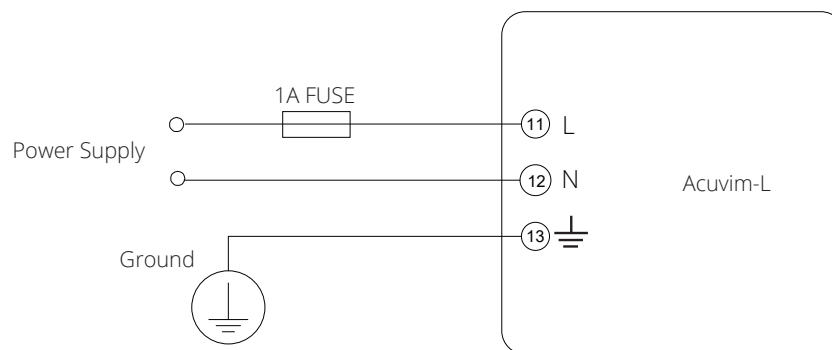


Fig 2-11 Wiring Connection of Power Supply

The wire of power supply should be AWG16~22 or 0.6~1.5mm².

A fuse (typical 1A/250Vac) should be used in the auxiliary power supply loop. No.13 terminal must be connected to the ground terminal of the switchgear. An isolated transformer or EMC filter should be used in the auxiliary power supply loop if the power supply has a power quality problem.

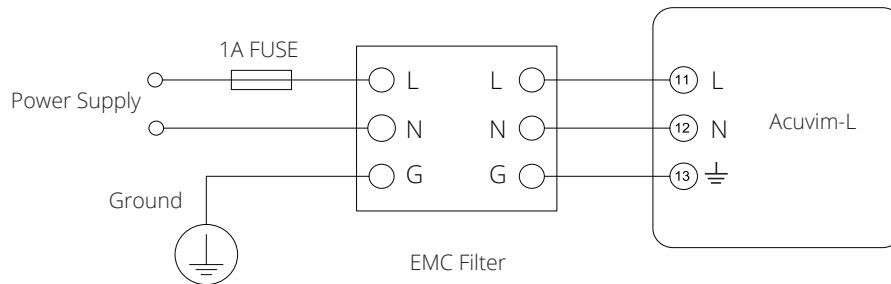


Fig 2-12 Wiring Connection of Auxiliary Power Supply with EMC Filters

Voltage Input

Maximum input voltage for the Acuvim-L series meter shall not exceed 400LN/690LL VAC RMS for three-phase or 400LN VAC RMS for single-phase systems. A potential Transformer (PT) must be used for high voltage systems. Typical secondary output for PTs shall be less than or equal to 400V. Please make sure to select an appropriate PT to maintain the measurement accuracy of the meter.

A fuse (typical 1A) should be used in the voltage input loop. The wire for voltage input could be AWG16~22 or 0.6~1.5mm².

Note: The secondary of the PT cannot be shorted. Otherwise, it may cause severe damage to the instrument.

Note: Under no circumstances should the secondary of the PT be shorted. The secondary the PT should be grounded at one end.

Please refer to the wiring diagram section for further details.

Current Input

Current Transformers (CTs) are required in most engineering applications. Typical current rating for the secondary side of the CT shall be 5A (standard) or 1A. CT choice is very important as it can impact the accuracy of the measurements. The accuracy of the CT should be better than 0.5%. The wire between CTs and the meter shall be as short as possible. A longer wire length may increase the error of the measurement.

The wire size of current input should be AWG15~16 or 1.5~2.5mm².

Note: Under no circumstance should the secondary side of the CT be an open circuit when the power is on. There should not be any fuse or switch in the CT loop. One end of the CT loop should be connected to the ground.

VN Connection

VN is the reference point of the Acuvim-L voltage input. Low wire resistance helps improve the measurement accuracy. Different system wiring modes require different VN connection method. Please refer to the wiring diagram section for more details.

Three-Phase Wiring Diagram

Acuvim-L can be used in nearly any kind of three-phase power system. Please read this section carefully before choosing the wiring diagram suitable for your power system.

Voltage and current input wiring mode can be set separately in the meter parameter setting process. The voltage wiring mode can be set as 3-phase 4-line Wye (3LN), 3-phase 3-line delta (3LL), 3-phase 3-line open delta (2LL), Single-phase 2-line (1LN), Single-phase 3-line (1LL). The current input wiring mode can be set as 3CT, 2CT and 1CT; Various wiring can be combined into six: 3LN-3CT (3CT or 2CT), 3LL-3CT, 2LL-3CT, 2LL-2CT, 1LL-2CT, 1LN-1CT.

2.3.3 Voltage Input Wiring

3-Phase 4-Line Wye mode (3LN)

The 3-Phase 4-Line Wye mode is popular in low voltage electric distribution power systems. For voltage lower than 400LN/690LL Vac, power line can be connected directly to the meter's voltage input port as shown in Fig 2-13. In the high voltage input system, 3PT Wye mode is often used as in Fig 2-14. The meter should be set to 3LN for both voltage levels.

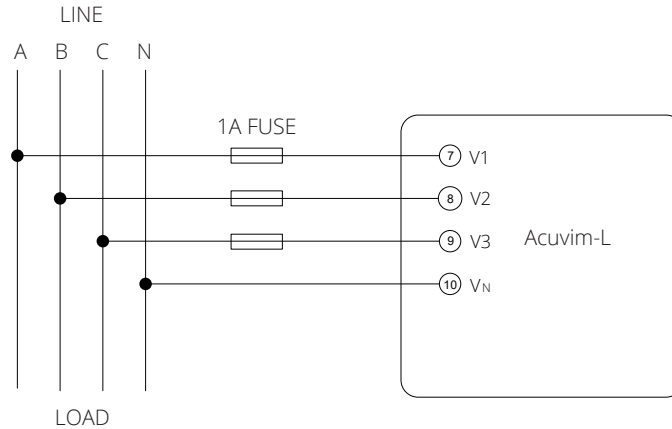


Fig 2-13 3LN Direct Connection

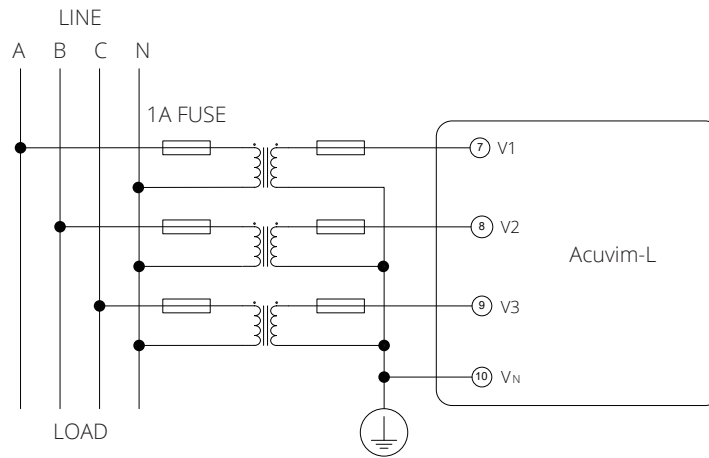


Fig 2-14 3LN Connection with 3PTs

3-Phase 3-Line Delta (3LL)

In a 3-Phase 3-Line system, power line A, B, and C are connected to V1, V2 and V3 directly. Vn is floated. The voltage input mode of the meter should be set to 3LL.

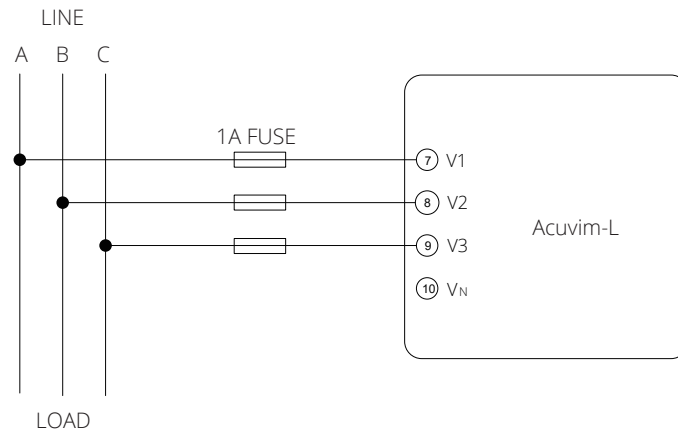


Fig 2-15 3LL 3-Phase 3-Line Direct Connection

3-Phase 3-Line open Delta Mode (2LL)

Open delta wiring mode is often used in high voltage system. V2 and VN are connected together in this mode. The voltage input mode of the meter should be set to 2LL for this voltage input wiring mode.

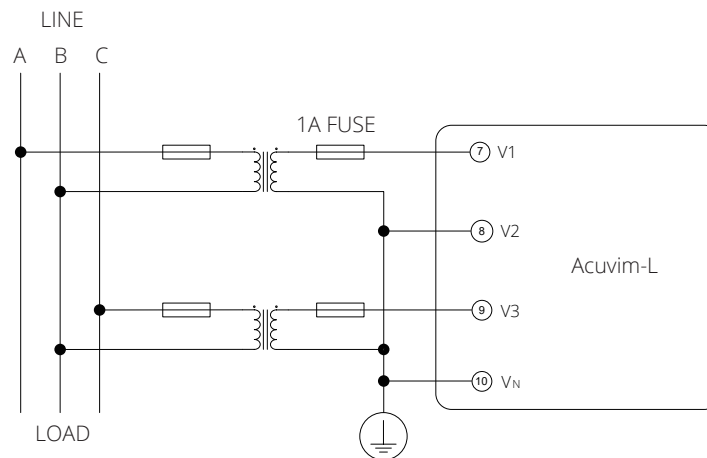


Fig 2-16 2LL with 2PTs

2.3.4 Current Input Wiring

3CT

The 3CT current wiring configuration can be used when either 3 CTs are connected (as shown in Fig 2-17) or 2 CTs (Only applicable when using 5A CTs) are connected (as shown in Fig 2-18) to the system. In either case, there is current flowing through all three current terminals.

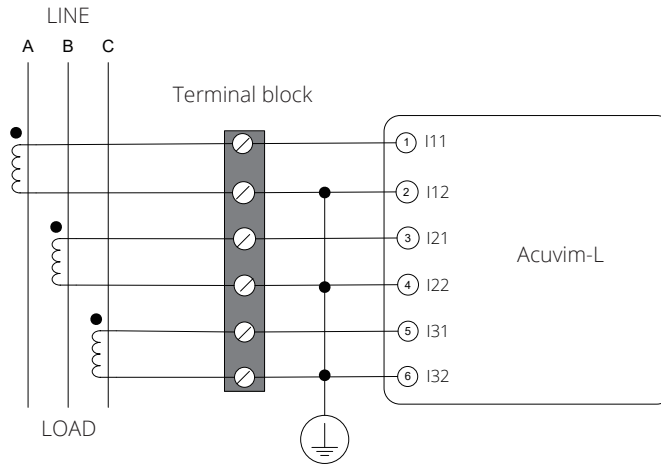


Fig 2-17 3CT

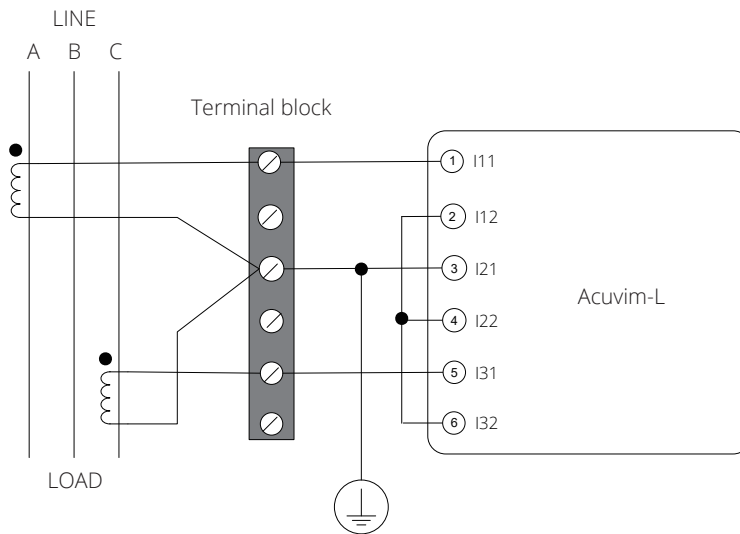


Fig 2-18 3CT

2CT

The difference between Fig. 2-18 and Fig 2-19 is that no current flows through current input terminal I21 and I22. The I2 value is calculated from formula $i_1+i_2+i_3=0$. The current input mode of the meter should be set to 2 CT.

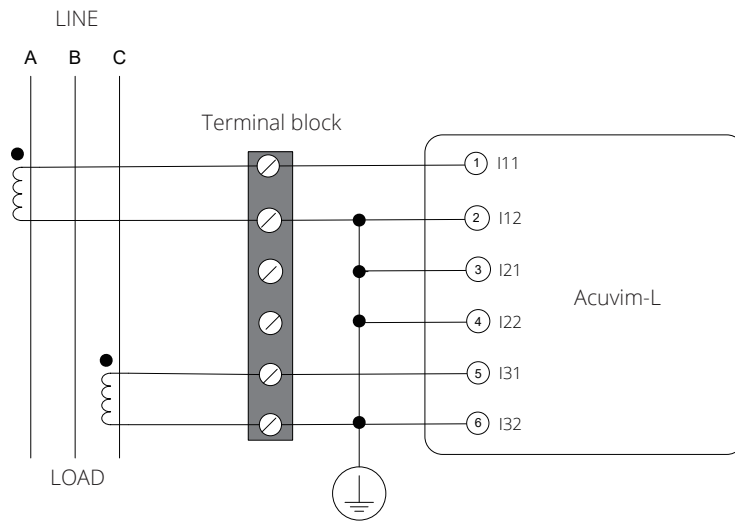


Fig 2-19 2CT

1CT

If the system is a balanced, three-phase system, the 1CT connection method can be used. The other two channels are calculated accordingly.

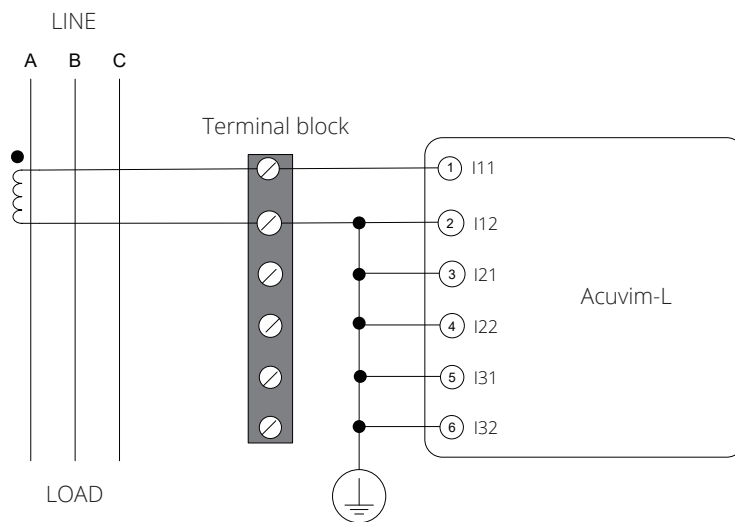


Fig 2-20 1CT

2.3.5 Frequently Used Wiring Method

In this section, the most common voltage and current wiring connection combinations are put together into different diagrams. In order to display measurement readings correctly, please select the wiring diagram appropriate to your setup and application.

The meter supports seven kinds of wiring: 3LN-3CT (3CT and 2CT two ways), 3LL-3CT, 2LL-3CT, 2LL- 2CT, 1LL-2CT, and 1LN-1CT.

1. 3LN, 3CT with 3CTs (Wiring mode: 3LN, 3CT)

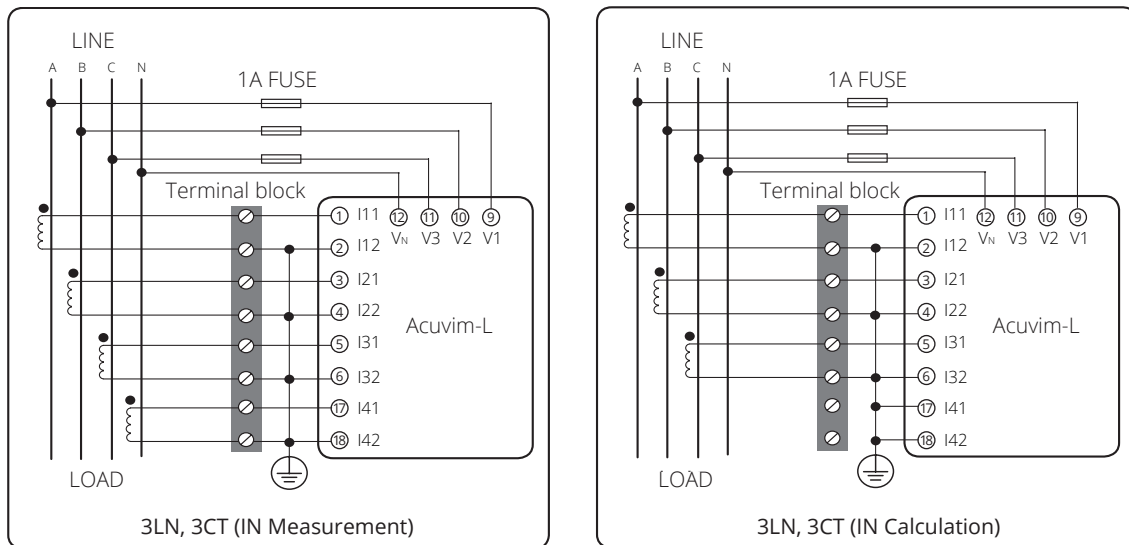


Fig 2-21 3LN, 3CT with 3CTs

2. 3LN, 3CT with 2CTs (Wiring mode: 3LN,3CT)

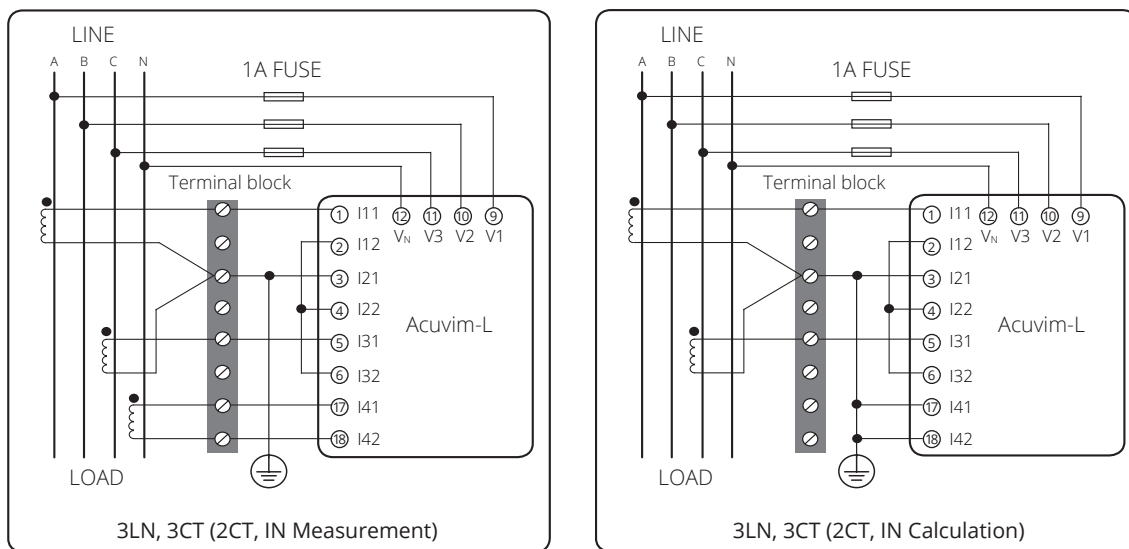


Fig 2-22 3LN, 3CT with 2CTs

3. 3LL, 3CT (Wiring mode: 3LL, 3CT)

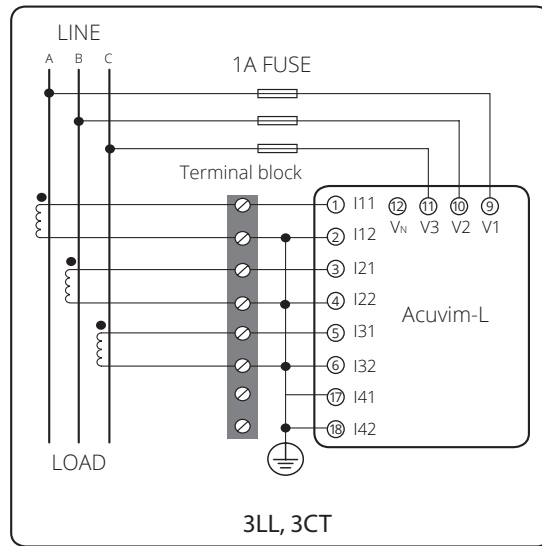


Fig 2-23 3LL, 3CT

4. 2LL, 3CT (Wiring mode: 2LL, 3CT)

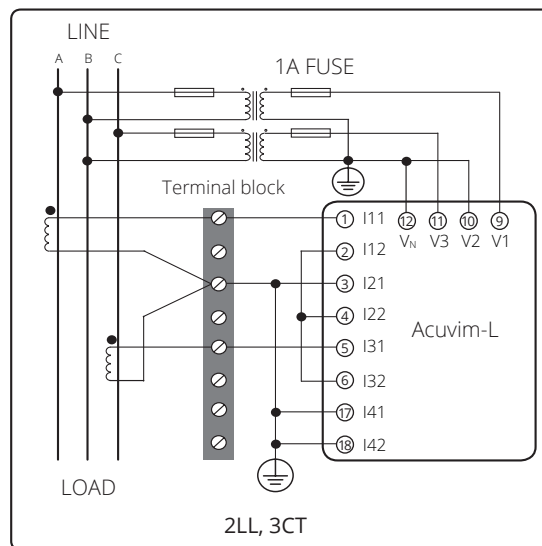


Fig 2-24 2LL, 3CT

5. 2LL, 2CT (Wiring mode: 2LL, 2CT)

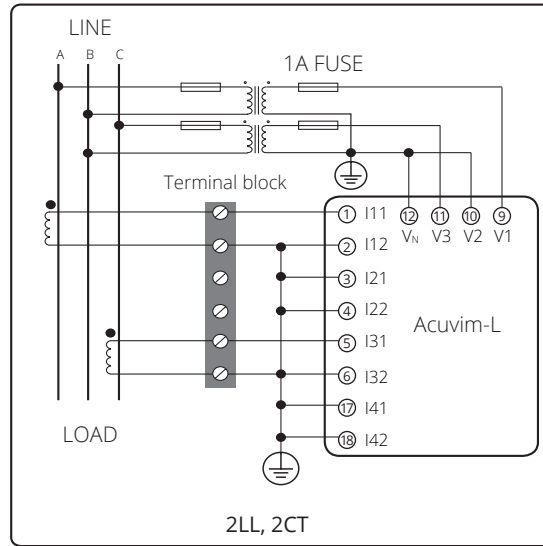


Fig 2-25 2LL, 2CT

6. 1LN, 1CT (Wiring mode: 1LN, 1CT)

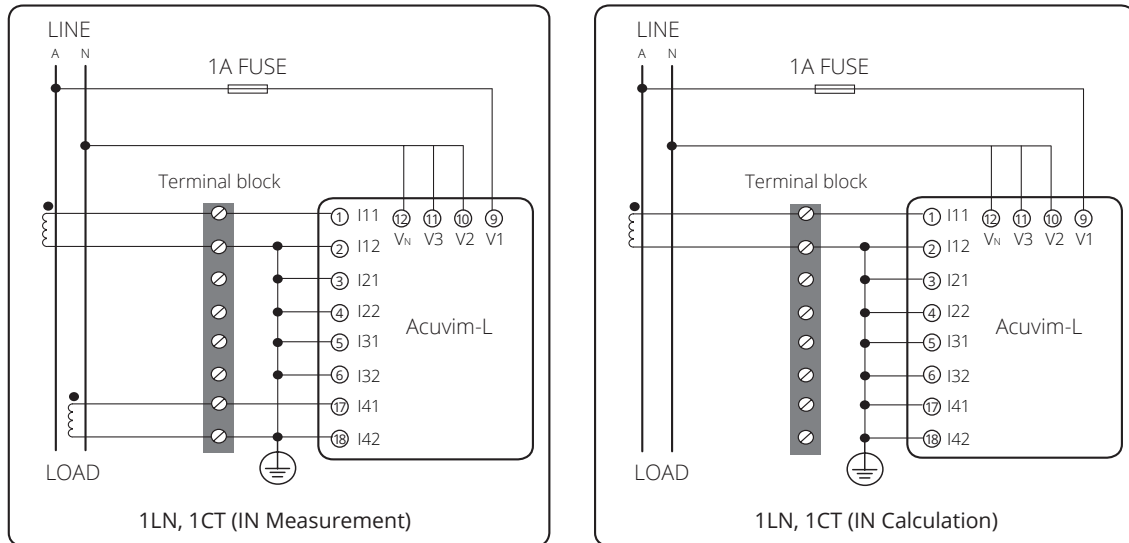


Fig 2-26 1LN, 1CT

7. 1LL, 2CT (Wiring mode: 1LL, 2CT)

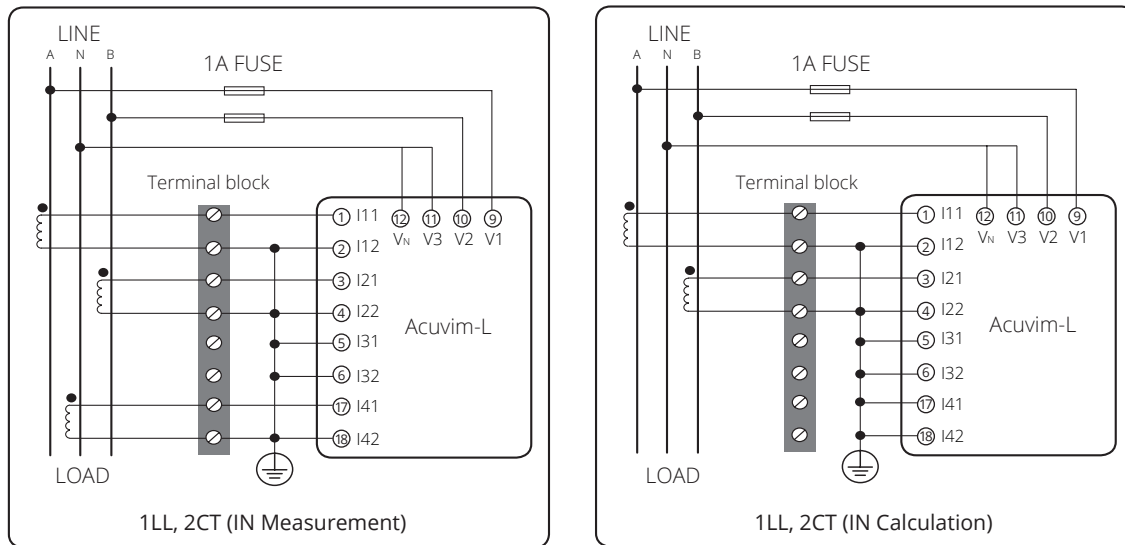


Fig 2-27 1LL, 2CT

2.3.6 Digital Output (DO)

There are two digital outputs for Acuvim-BL. The terminals of the digital output are DO1, DO2 and DOC. The terminals of the digital output circuits of the Acuvim-EL/CL extension modules are DO11, DO12, DO21, and DO22. These two digital outputs can be used as energy pulse output or over/under limit alarming output. Acuvim-CL/EL meters with optional I/O expansion modules only have the Digital Output function.

Digital output circuit form is Photo-MOS. The simplified circuit is as below:

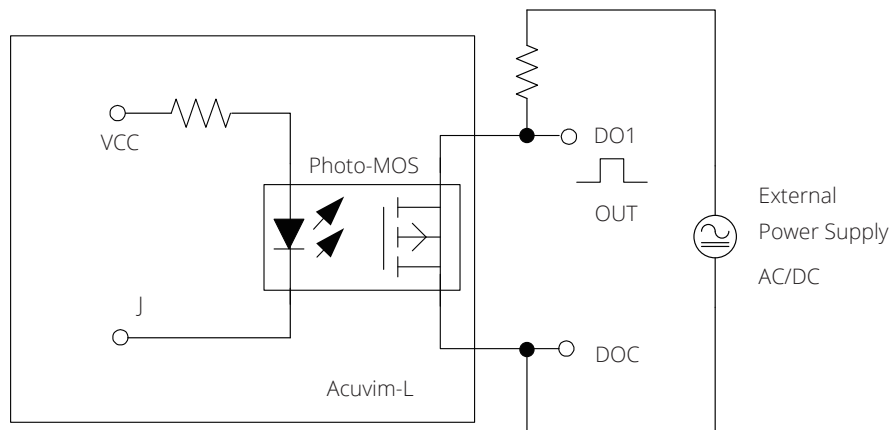


Fig 2-28 Digital Output Circuit

In Fig 2-28, when the internal signal J is in a low state, OUT is also in a low state and therefore no pulse output. When J is in a high state, OUT is in the high state which will then output a pulse.

The max output voltage and current are 250Vac/300Vdc and 100mA.

For DC applications, the DO output terminal should be connected in parallel clamping diodes D to prevent over-voltage during switching.

When the digital output is used as pulse energy, DO1, DO2 can be independently programmed to select the electrical energy to be output; for example, DO1 active energy output, DO2 output reactive energy. The pulse width and pulse constant can be set.

When the digital output is used as over/under limit alarming output, the upper and lower limit of the parameter, time interval, and output port can be set from the meter front for the Acuvim BL, and the Acuvim CL/EL can be programmed using the Acuvim software or through the meter display.

2.3.7 Digital Input (DI)

There are 4 dry-contact digital input in extension modules respectively. The digital input circuit can be used to detect remote signals or be used as a counter of input pulses.

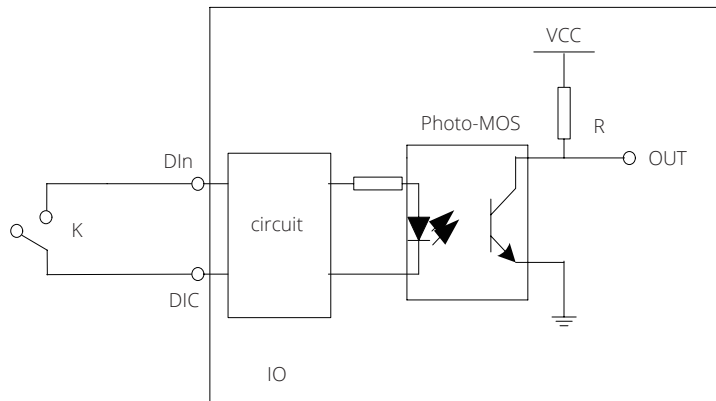


Fig 2-29 DI Input Circuit Diagram

The circuit drawing of digital input is simplified as Fig 2-29.

When the switch, K, is open, OUT is in a high state. When the switch K is closed, OUT is in a low state. The wire of digital input should be between AWG22~16 or 0.5~1.3mm².

2.3.8 Communication

Some Acuvim-L series meters use RS485 serial communication and the Modbus-RTU protocol. If equipped, the terminals of communication are A, B, and S (14, 15, and 16). A is differential signal (+), B is differential signal (-), and S is connected to the shield of twisted pair cable. The overall length of the RS485 cable connecting all devices cannot exceed 1200m (4000ft). In addition, the more devices connected to a single RS485 line, the slower the data transfer will be. Therefore, a lower baud rate is recommended in circumstances where many devices are connected via RS485. Acuvim-L series meter can be used as a slave device of a master device such as PC, PLC, Data Collector, or RTU.

If the master does not have RS485 communication port, a converter (such as a RS232/RS485 or a USB/RS485 converter) will be required. Typical RS485 network topologies include line, circle, and star (wye).

Acuvim-CL /EL supported expansion module also supports Modbus-RTU serial communication protocol, which allows the meter to have two independent communication ports using Modbus RTU simultaneously.

Data transfer format is start bit + 8 data bits + parity + stop bit. NON1, NON2, Odd and EVEN could be selected in the mode of parity. NON1 represents non-parity, single stop bit; NON2 represents non-parity, double stop bit; Odd represents odd-parity, single stop bit; EVEN represents EVEN-parity, single stop bit.

Follow these recommendations to improve communications quality:

Quality shielded twisted pair is very important and it is recommended to use AWG22 (0.6mm²) or larger diameter of the line with two strands of different colors.

The shield of the RS485 cable must be connected to the ground at one end only. Every A (+) should be connected to A (+), B (-) to B (-), or it will influence the network or even damage the communication interface.

“T” type connection topology should be avoided. This means no new branches except from the starting point.

As much as possible, keep communication cables away from sources of electrical noise. When several devices are connected (daisy chain) along the same, long communication line, an anti-signal reflecting resistor (typical value 120Ω- 300Ω) is often used at the end of the circuit (the last meter of the chain) in cases where the communication quality is distorted.

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

Chapter 3: Basic Operations and Applications

The detailed human-machine interface of the meter will be described in this chapter. This includes viewing real-time metering data and setting parameters using different key combination.

3.1 Display Panel and Keys

The front of the Acuvim L series meter consists of an LCD screen and four control keys. All the display segments are illustrated in Fig 3-1. Users should note that all the segments will not display in a single page under normal conditions.

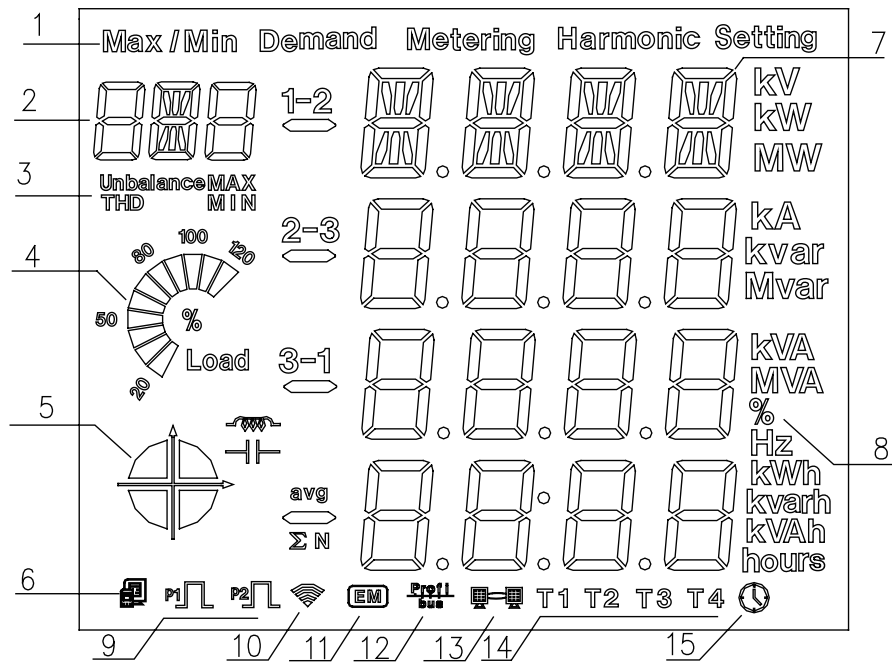


Fig 3-1 All Display Segments

Table 3-1 Symbols on the LCD Screen

| SN | Display | Description |
|----|--------------------------------------|---|
| 1 | Display mode indication | Shows different modes on the display area. "Meter" for real-time measurement; "Max/Min" for statistical data; "Demand" for power demand data; "Harmonic" for harmonic data; "Setting" for parameters setting. |
| 2 | Parameter name or ordinal | Display Parameter name or ordinal |
| 3 | Unbalance, THD, MAX, MIN | "Unbalance" for unbalance of the voltage and current; "THD" for total harmonics distortion; "MAX" for maximum and "MIN" for minimum |
| 4 | Load rate | Displays the percentage of load current to the nominal current. |
| 5 | Four quadrant icon Load type icon | quadrant of the system power; : inductive load; : capacitive load. |
| 6 | Communication icon | No icon: no communication One icon: query sent Two icons: query sent and response received |

| SN | Display | Description |
|----|--------------------------|---|
| 7 | Data Display area | The contents of the display data in the region |
| 8 | Unit display area | Display Data Unit |
| 9 | Pulse output status icon | Display pulse output status |
| 10 | WIFI module icon | This option not available on Acuvim-L. |
| 11 | Expansion Module icon | Display expansion module status |
| 12 | PROFIBUS connection icon | Icon: PROFIBUS modules |
| 13 | Ethernet connection icon | Icon: Ethernet modules |
| 14 | Current rates icon | T1, T2, T3, T4, respectively, sharp, peak, valley, and normal four season rates |
| 15 | Time icon | Icon: Displays the current data region time value |

There are five dedicated keys on the meter: H, P, E, V/A, and Seal keys (seals meter with the key, ordinary meter no). Through these four keys to achieve different interface switching and parameter settings.

In any screen, press the V/A key and E key simultaneously will enter the system information display.

Select the display module in this interface. In this case, pressing H cancels the operation; pressing P or E selects the functional modules; pressing the V/A key confirms the selection module and enters the function module. Operation flow is shown below.

Note: If the LCD backlight is off, pressing any key once will turn the backlight on.

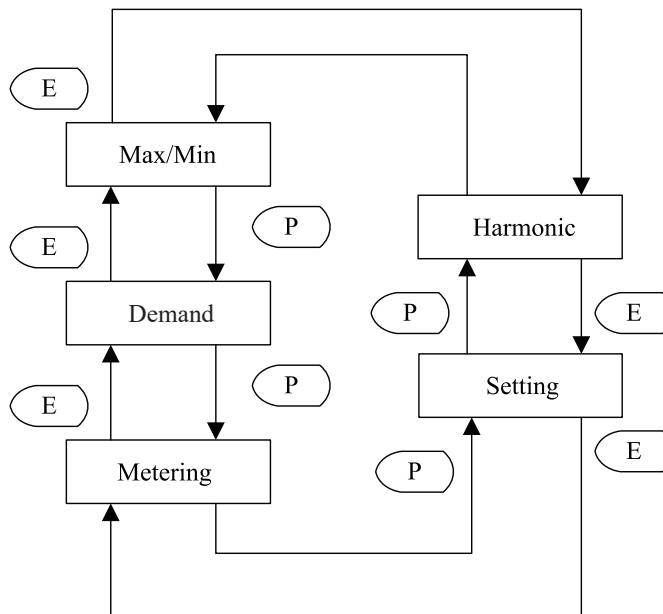


Fig 3-2 Operation Mode Selection Flow Chart

3.2 Metering Data

Press H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor left or right to "Meter", then press V/A, and you will enter the metering mode. The following table shows the contents of the display.

Table 3-2 Metering Data Display Table

| Module Name | | Display Interface | Remark Explanation |
|-------------------------|---------------------------------------|---|--|
| Voltage Current Module | | Default page | The default page: First line: the avg of line voltage; Second line: system active power; Third line: avg of current; Fourth line: system Power Factor. |
| | | Three phase voltage & avg | |
| | | Three phase line voltage & avg | |
| | | Three phase current & neutral current | |
| | | Three phase current & avg | |
| | | Three phase current & total current value | |
| Power Module | | Three phase & system active power | |
| | | Three phase & system reactive power | |
| | | Three phase & system apparent power | |
| | | Three phase & system Power Factor | |
| | | System power | |
| | | Power factor and frequency | |
| Real-time Energy Module | System Active Energy | System import active energy | |
| | | System exports active energy | |
| | | System total active energy | |
| | | System net active energy | |
| | System Reactive Energy | System import reactive energy | |
| | | System exports reactive energy | |
| | | System reactive total energy | |
| | | System reactive net energy | |
| | System Apparent Energy | System import apparent energy | |
| | | System exports apparent energy | |
| | | System apparent total energy | |
| | | System apparent net energy | |
| Unbalance | Unbalance display interface | | |
| | Voltage phase angle display interface | | |
| | Current phase angle display interface | | |

| Module Name | | | Display Interface | Remark Explanation |
|--|---|----------------|----------------------------|---|
| Current month TOUenergy (Accumulated) | Total | ActiveEnergy | Import active energy | In this module, press the V/A key to switch toTOU demand interface. |
| | | | Export active energy | |
| | | | Active total energy | |
| | | | Active net energy | |
| | | ReactiveEnergy | Inductive reactive energy | |
| | | | Capacitive reactive energy | |
| | | | Reactive total energy | |
| | | | Reactive net energy | |
| | | ApparentEnergy | Import apparent energy | |
| | | | Export apparent energy | |
| | | | Apparent total energy | |
| | | | Apparent net energy | |
| Shape | Ditto | Ditto | | |
| Peak | Ditto | Ditto | | |
| Normal | Ditto | Ditto | | |
| Valley | Ditto | Ditto | | |
| Prior month sharingtime energy (Accumulated) | Page structure of power sharing with the previous month | | | |
| Current month TOUenergy (Incremental) | Page structure of power sharing with the previous month | | | |
| Prior month TOU energy (Incremental) | Page structure of power sharing with the previous month | | | |

3.2.1 Voltage and Current Display

Press V/A to read voltage and current in the metering area. The screen will roll to the next page as you press V/A each time. It will go back to the first screen if you press V/A at the last screen.

The following figure shows how it rolls:

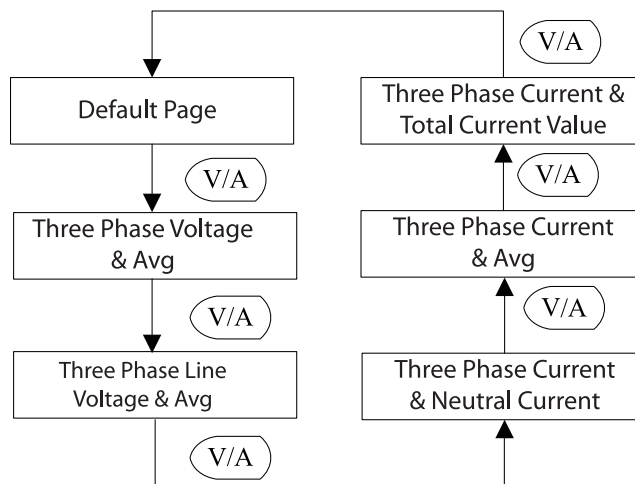


Fig 3-3 Voltage and Current Display Module Key Operation

Note: When the meter is set to “2LL” or “3LL”, there is no three-phase voltage & AVG and three-phase current & neutral current display; when the meter is set “1LN”, there is only A phase voltage and A phase current display; when the meter is set “1LL”, there is no C phase voltage and C phase current display.

3.2.2 Power Display

Power display screen, press the P key to turn. The following figure shows the sequence:

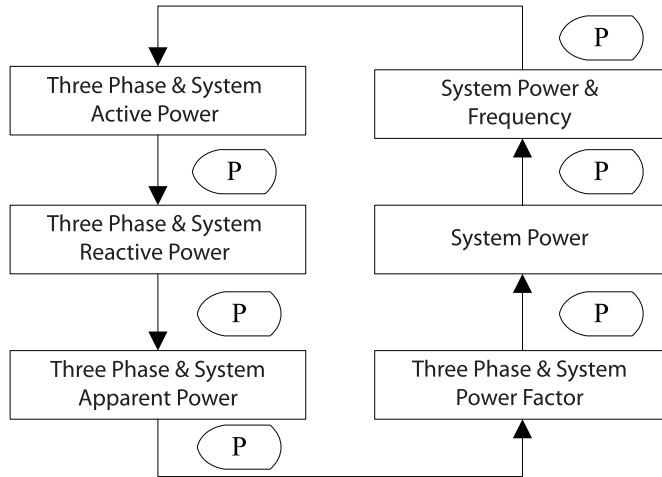


Fig 3-4 Power Module Key Operation Flowchart

Note: When the meter is set to “2LL” or “3LL”, only the system power and system power & frequency will be displayed. When the meter is set to “1LN,” only A phase power and power factor will be display. When the meter is set to “1LL”, there is no C phase power and C phase power factor display.

3.2.3 Real-Time Energy Display

Pressing the E key displays real-time energy. The screen will scroll to the next page each time you press E. It will go back to the first screen once you press E at the last screen.

The following figure shows how it scrolls:

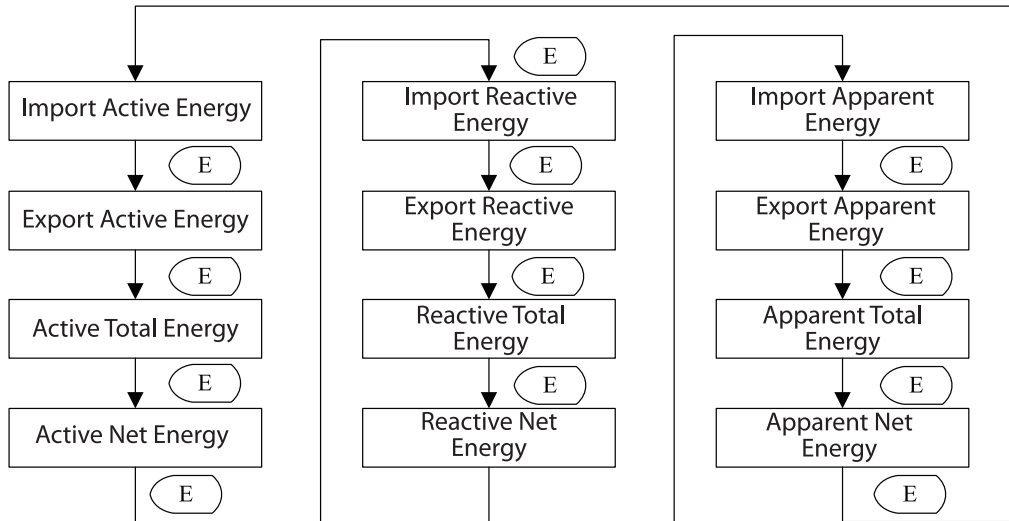


Fig 3-5 Energy Display Key Operation Flowchart

3.2.4 Phase Angle and Unbalance Display

Pressing H displays phase angles and unbalance data. The screen will scroll to the next page each time you press H. It will go back to the first screen once you press H at the last screen.

The following figure shows how it scrolls:

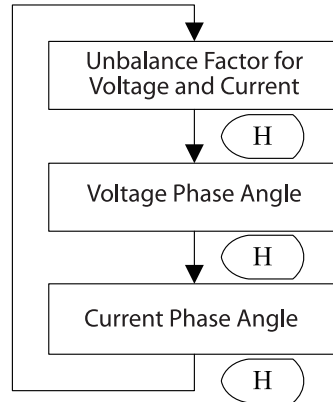


Fig 3-6 Unbalance Key Operation

Voltage stands for line-to-line voltage when the wiring setting is “2LL” or “3LL” and for line-to-neutral voltage when other wiring settings. When the meter is set to “1LN”, there is only phase A current to phase A voltage angle display. When the meter is set to “1LL”, there is no phase C voltage or current to phase A voltage angle factor display. Rogowski coils do not support the phase angle or the unbalance functions.

3.2.5 TOU Energy Display

To display TOU energy parameters in the metering module, pressing the P key and V/A key simultaneously will enter the TOU energy display module. Key operations for this module are shown in Fig 3-7. TOU rates are divided into the total, sharp, peak, valley, and normal. H key: turn between total, sharp, peak, valley, and normal; P key: turn over the Current Month TOU (Accumulated energy), Current Month TOU (Incremental energy), Prior Month TOU (Accumulated energy) and Prior Month TOU (Incremental energy). V/A key: switch to the appropriate TOU demand maximum display interface. E key: flip over each module.

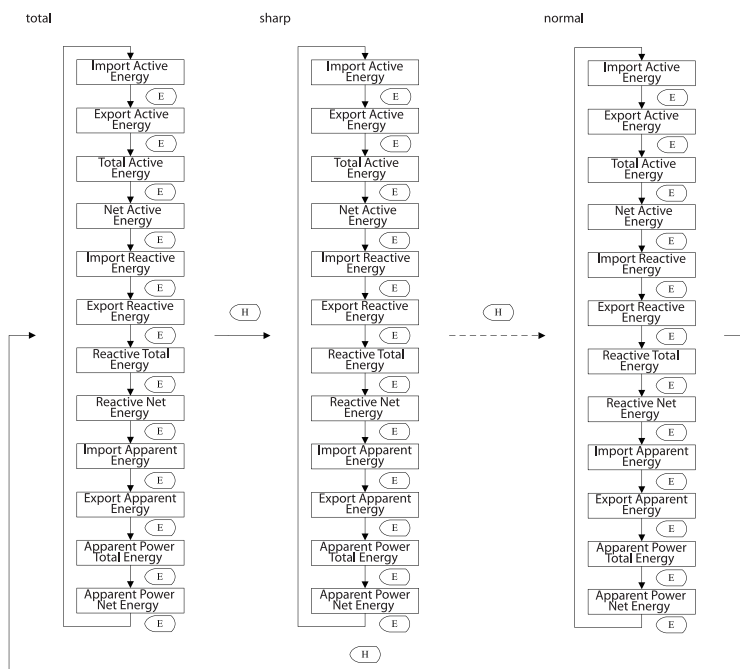


Fig 3-7 The Operation of TOU Energy

3.3 Statistics Display

See the contents of the Min/Max Statistics module in the table below.

Table 3-3 Max/Min Statistics Display Table

| Module Name | Display Interface |
|------------------------------------|--------------------------------------|
| Max/Min of the Voltage and Current | Max value of Phase Voltage |
| | Min value of Phase Voltage |
| | Max value of Line Voltage |
| | Min value of Line Voltage |
| | Max value of Current |
| | Min value of Current |
| Max/Min of the Power | Max value of System Power |
| | Min value of System Power |
| | Max value of Power Factor, Frequency |
| | Min value of Power Factor, Frequency |
| | Max value of Power Demand |
| | Max value of Current Demand |
| Max/Min of the THD | Max value of Voltage Harmonic |
| | Min value of Voltage Harmonic |
| | Max value of Current Harmonic |
| | Min value of Current Harmonic |
| | Max value of Unbalance |
| | Min value of Unbalance |

3.3.1 They Keys Operation of Voltage/Current the Most Value Module

The following figure shows the sequence:

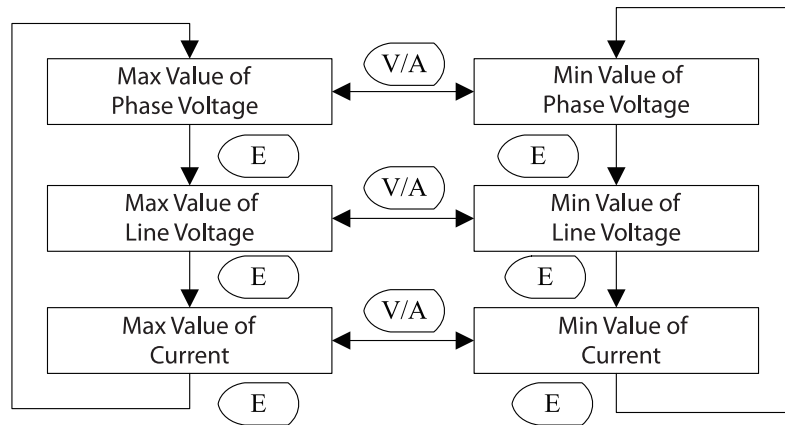


Fig 3-8 Voltage/Current the Most Value Keys Operation Flowchart

Note: For 2LL/3LL voltage wiring, there is no max/min value of phase voltage to display. When the voltage wiring is set to 1LL, phase voltage: No C-phase voltage; line voltage, no Ubc and Uca display; current: no C phase current; when the voltage wiring set 1LN, phase voltage: only A phase display, line voltage: no display, current: only A phase display.

3.3.2 The Max Value of Power Display

The following figure shows the sequence:

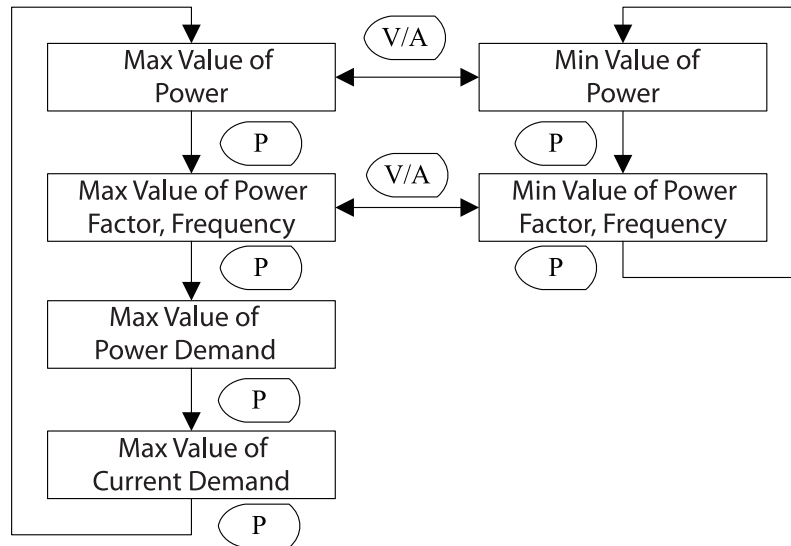


Fig 3-9 The Max Value of Power Display Module Keys Operation Flowchart

Note: When the voltage wiring for the 1LL, voltage and current phase imbalance do not display, no C-phase current demand displays. When the voltage wiring set 1LN, only the A-phase current demand.

3.3.3 The Max Harmonic Distortion Display

The following figure shows the sequence of the key operation of the max harmonic distortion module.

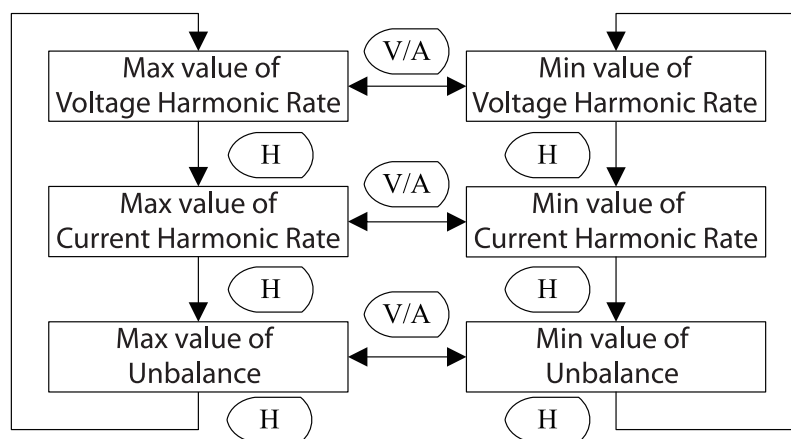


Fig 3-10 The Keys Operation of Harmonic Distortion the Most Value Module

Note: When the voltage wiring for the 1LL, no U_c, I_c THD; when the voltage wiring set 1LN, only show U_a and I_a THD.

3.4 Demand Display

In the demand display module, display current demand, voltage demand, current forecasted demand and voltage forecasted demand parameters. The interface is described in the table below.

Table 3-4 Demand Display Table

| Module Name | Display Interface | Remark Instruction | |
|---------------------------------|-------------------------------------|-----------------------------------|---|
| Real-Time Demand Display Module | Power Demand Interface | | |
| | Current Demand Interface | | |
| | Power Forecasted Demand Interface | | |
| | Current Forecasted Demand Interface | | |
| TOU Demand Max | Total | Power Import Demand Max Interface | In this module, press the V/A key to switch directly to the appropriate sharing of electrical interface |
| | | Power Export Demand Max Interface | |
| | | Current Demand Max Interface | |
| | Sharp | Ditto | |
| | Peak | Ditto | |
| | Valley | Ditto | |
| | Normal | Ditto | |

3.4.1 Demand Display Module Key Operation

H key: flip. The following figure shows the sequence:

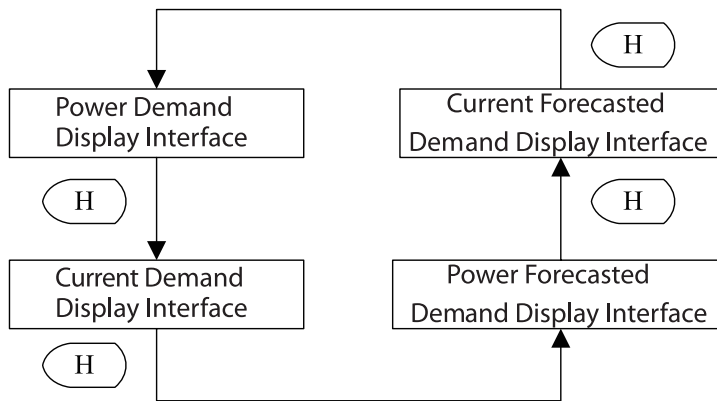


Fig 3-11 Demand Display Module Keys Operation

Note: When the voltage wiring for 1LL, no C-phase current demand; when the voltage wiring set 1LN, no B, C phase current demand.

3.4.2 TOU Maximum Demand

In demand module, press the P key and V/A key to enter the TOU demand module. The key operations are as follows:

- P key: between total, sharp, peak, valley, and normal rates switching
- E key: flip In each page rates
- V/A key: Switch to TOU power display interface

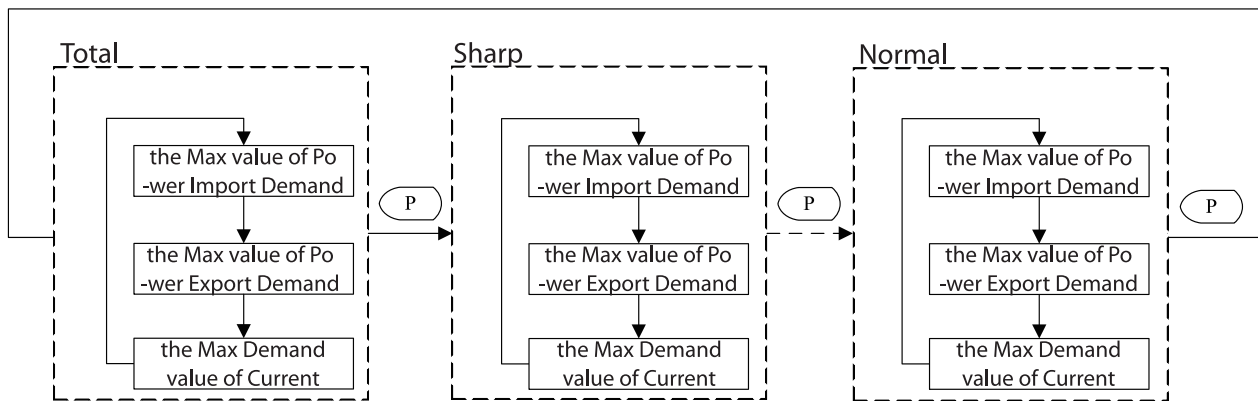


Fig 3-12 TOU Demand Keys Operation

3.5 Harmonics Data Display

To view the content in the harmonic display module, refer to the following table:

Table 3-5 Harmonic Display Table

| Module Name | Display Interface |
|------------------|--|
| Basic Parameters | Voltage THD Rate |
| | Voltage Odd Harmonic Distortion Rate |
| | Voltage Even Harmonic Distortion Rate |
| | Voltage Crest Factor |
| | Voltage/Current Harmonics Form Factor |
| | Current THD Rate |
| | Average Current Harmonic Distortion Rate |
| | Current Odd Harmonic Distortion Rate |
| | Current Even Harmonic Distortion Rate |
| | Current K Factor |

| Module Name | Display Interface | |
|---------------------|-----------------------|-----------------------------|
| Harmonic Ratio Data | Voltage Each Harmonic | Voltage 2nd Harmonic Ratio |
| | | |
| | | Voltage 63rd Harmonic Ratio |
| | Current Each Harmonic | Current 2nd Harmonic Ratio |
| | | |
| | | Current 63rd Harmonic Ratio |

Note:

1. BL and CL support 2nd~31st harmonics, EL supports 2nd~63rd harmonics.
2. Rogowski coils do not support harmonic function.
3. If the IN is calculated, the parameters related to the IN harmonic parameters are blocked.

3.5.1 Basic Parameters Key Operation

H key: flip. The following figure shows the sequence:

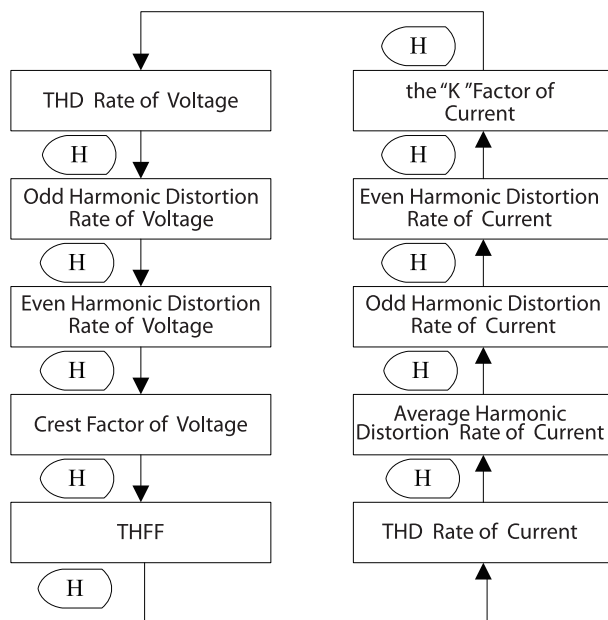


Fig 3-13 Harmonic Basic Parameter Displays Key Operational Processes

Note: When the voltage wiring is 1LN, only the phase A parameters are shown. When the voltage wiring is set to 1LL, the phase C content is not displayed.

3.5.2 Harmonic Ratio Data Display

- E key: add one each time the E key is pressed
- P key: add ten each time the P key is pressed
- V/A key: Between the voltage parameters and current parameters switch.

The following figure shows the sequence:

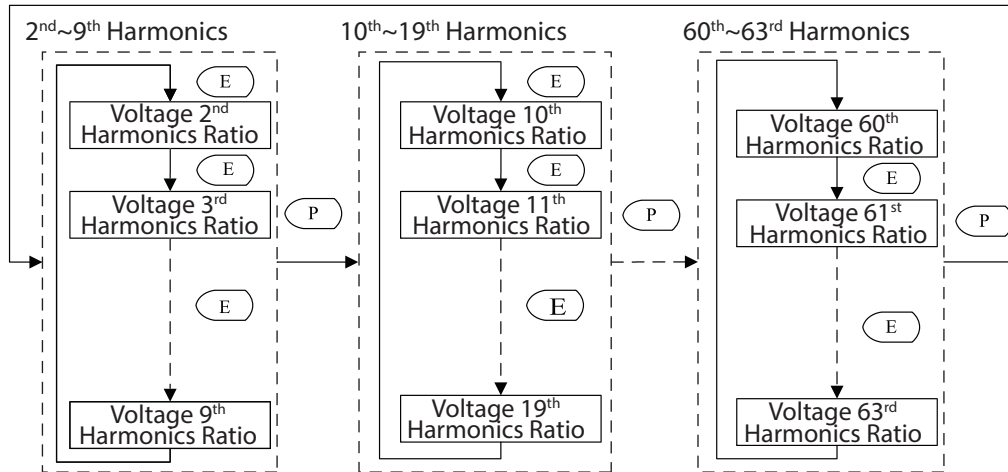


Fig 3-14 Each Harmonic Key Operation Flowchart

3.6 Parameter Setting Mode

In setting mode, there are four modules: the I/O module, the system module, the power quality module, and the network module. The table that follows shows the setting parameters.

Table 3-6 Setting the Interface Display Table

| Module Name | Display Interface | Page Number | Setting Range |
|----------------------|--|-------------|--|
| Basic Settingsmodule | Address of communication channel 1 | S01 | 1~247 |
| | Baud rate of communication channel 1 | S02 | 1200/2400/4800/9600/19200/38400/57600 |
| | Parity mode of communication channel 1 | S03 | EVEN: Even parity; Odd: Odd parity; non1: no parity 1 stop bit; non2: No parity Stop bit double; |
| | Voltage wiring set | S04 | 3LN/3LL/2LL/1LN/1LL |

| Module Name | Display Interface | Page Number | Setting Range |
|--------------------------------------|--|---------------------------------------|---|
| Basic Settings module | Current wiring set | S05 | 3CT/2CT/1CT |
| | I1 Direction | S06 | P: Positive N: Negative |
| | I2 Direction | S07 | Ditto |
| | I3 Direction | S08 | Ditto |
| | PT2 setting | S09 | 50.0 ~ 400.0 |
| | PT1 setting | S10 | PT2 ~ 1000000.0 |
| | CT2 setting | S11 | See Note 1 |
| | CT1 setting | S12 | 1 ~ 5000.0 |
| | CTN2 setting | S13 | See Note 1 |
| | CTN1 setting | S14 | 1 ~ 5000.0 |
| | In definition | S15 | 0: Calculation 1: Measurement |
| | Reactive power is defined settings | S16 | 0: True reactive; 1: Generalized reactive |
| | Turn on the Backlight | S17 | 0 ~ 120(min) |
| | Demand calculation mode selection | S18 | 0: sliding block method; 1: Fixed block method; 2: Rolling block method; 3: Thermal Demand Method |
| | Demand slide time setting | S19 | 1 ~ 30(min) |
| | Sub-Interval | S20 | 1 ~ 30(min) |
| | VAR/PF statute setting | S21 | IEEE/IEC |
| | Energy metering settings | S22 | Prl: primary; SEC: Secondary side |
| | Clear demand | S23 | no: Not cleared; yes: Cleared |
| | Clear Max and Min | S24 | no: Not cleared; yes: Cleared |
| Clear energy enable | S25 | Dis: Disable; En: Enable | |
| Acknowledgement to clear energy | S26 | no: Not cleared; yes: Cleared | |
| Clear time setting | S27 | no: Not cleared; yes: Cleared | |
| Address of communication channel 2 | S28 | 1~247 | |
| Baud rate of communication channel 2 | S29 | 1200/2400/4800/9600/19200/38400/57600 | |
| Basic Settings module | Parity type of communication channel 2 | S30 | EVEN: Even parity; Odd: Odd parity; non1: no parity 1 stop bit; non2: No parity Stop bit double; |
| | Enable wiring check | S31 | Dis: Disable; En: Enable |
| | Expected Load Type | S32 | C/L/r |
| | Expected Power Factor | S33 | -1000 ~ 1000 |
| | Setting password protection | S34 | 0000 ~ 9999 |

| Module Name | Display Interface | Page Number | Setting Range |
|------------------------|--|-------------|--|
| I/O module settings | DI Type | I01 | See Note 2 |
| | DI Pulse Constant | I02 | 1 ~ 56635 |
| | DI Counters Clear | I03 | no: Not cleared; yes: Cleared |
| | DO1 function selection | I04 | 0: Pulse energy output; 1: Alarm 1 Output; 2: Alarm 2 Output; 3: Alarm 1 or 2 Output; 4: Communication control |
| | DO2 function selection | I05 | Ditto |
| | DO pulse constant | I06 | 1 ~ 60000 |
| | DO pulse width setting | I07 | See Note 3 |
| | DO1 output resistor selection | I08 | 0: None; 1: Ep_imp; 2: Ep_exp; 3: Eq_imp; 4: Eq_exp |
| | DO2 output resistor selection | I09 | Ditto |
| | Alarm delay time setting | I10 | See Note 4 |
| | The first alarm variable selection | I11 | 0 ~ 51 (see address list) |
| | The first alarm upper and lower limit selection | I12 | 0 ~ 51 (see address list) |
| | The first alarm threshold settings | I13 | See Note 5 |
| | The second alarm variable selection | I14 | 0 ~ 51 (see address list) |
| | The second alarm upper and lower limit selection | I15 | 0 ~ 51 (see address list) |
| | Setting a second alarm threshold | I16 | See Note 5 |
| | Alarm backlit selection | I17 | On: Alarm back blink; OFF: Alarm backlight does not blink |
| | Clear alarm log | I18 | no: Not cleared; yes: Cleared |
| | DO output model by communication control | I19 | 1: Level; 2: Pulse |
| Power Quality Settings | Rated voltage settings | Q1 | 50 ~ 400V |
| | Voltage fail value | Q2 | 20 ~ 100% |
| | Voltage sag value | Q3 | 20 ~ 100% |
| | Rated current settings | Q4 | 500 ~ 5000mA |
| | Set the current value of the overcurrent | Q5 | 50 ~ 150% |
| | Sets the number of half-cycles | Q6 | 4 ~ 200 |
| | Clear power quality eventlog | Q7 | no: Not cleared; yes: Cleared |

| Module Name | Display Interface | Page Number | Setting Range |
|-------------------------------|-----------------------------|-------------|-----------------------------|
| Module NetworkSettings Module | DHCP settings | N1 | 0: Static IP; 1: Dynamic IP |
| | IP address setting | N2 | — |
| | Submask | N3 | — |
| | Gateway address | N4 | — |
| | DNS Settings | N5 | — |
| | MODBUS-TCP/IP port settings | N6 | 2000 ~ 5999 |
| | HTTP port settings | N7 | 6000 ~ 9999 |
| | Language selection Settings | N8 | — |
| | Network Reset selection | N9 | — |

Note:

1. When the CT type of the meter is 5A and 1A, writing 1 or 5 is supported; when the CT type of the meter is 200mA, 80, 100, or 200 can be selected. It cannot be modified for other CT types
2. 0x0 ~ 0xF, bit0 ~ bit3 correspond DI1 ~ DI4, where 1 represents the pulse count, 0 represents SOE state
3. 20 ~ 3000ms
4. 0 ~ 255 (300ms), for example, set a value of 1, the actual alarm delay of 300ms
5. Depending on the parameters of the alarm, set the threshold range using the table below

| Number | Parameter Name | Setting Range |
|--|---|----------------------|
| 1 | F | 0 ~ 655.35 HZ |
| 2/3/4/5/6/7/8/9 | $U_A / U_B / U_C / U_{inavg} / U_{A-B} / U_{B-C} / U_{C-A} / U_{llavg}$ | 0 ~ 6553.5 V |
| 10/11/12/13(14)/15/16/11/12/13(14)/15/16 | $I_A / I_B / I_C / I_N / I_{tato} / I_{avg}$ | 0 ~ 65.535 A |
| 17/18/19/20/35 | $P_A / P_B / P_C / P_{CON} / P_{DEMA}$ | -32.768 ~ 32.768kw |
| 21/22/23/24/36 | $Q_A / Q_B / Q_C / Q_{CON} / Q_{DEMA}$ | -32.768 ~ 32.768kvar |
| 25/26/27/28/37 | $S_A / S_B / S_C / S_{CON} / S_{DEMA}$ | 0 ~ 65.535KVA |
| 29/30/31/32 | $PF_A / PF_B / PF_C / PF_{CON}$ | -1.000 ~ 1.000 |
| 33/34 | U_{unbl} / I_{unbl} | 0 ~ 100.0% |
| 38/39/40/41 | $I_{A_DEMA} / I_{B_DEMA} / I_{C_DEMA} / I_{N_DEMA}$ | 0 ~ 65.535 A |
| 42/43/44/45/46/47/48/49/50 | THD_V1/THD_V2/THD_V3/THD_V/THD_I1/ THD_I2/THD_I3/ THD_IN/ THD_I | 0 ~ 655.35% |
| 51 | Reverse phase sequence | 0/1 |

Pressing H and V/A simultaneously will activate the display mode selection and the cursor will flash. Press P or E to move the cursor left or right to "Setting", then press the V/A key to enter the parameter setting mode.

First, the device address will appear for several seconds and then go to the password inquiry page. "Password" is the key to the parameter setting mode and only a valid password will permit access to the meter settings. This function prevents mis-operation and unauthorized people from modifying the meter parameters. There are 4 digits of password in the meter, which can be set from "0000" to "9999" with the default value of "0000". User should input the right password and press V/A key to go through to the parameter selection page; otherwise, the meter will remain at the password inquiry page.

Key functions when inputting password:

- Press H, move the flashing cursor to the next position.
- Press P, the flashing number will add one.
- Press E, the flashing number will minus one.
- Press V/A, confirm the password.

In the parameter setting mode, parameters, such as system basic parameters, expanded I/O module parameters, power quality parameters and network module parameters can be read and modified.

3.6.1 Key Operation Setting Module

E key and P key, move the cursor downwards and upwards.

V/A key: Choose the parameter and enter the parameter modify mode. Fig 3-15 shows key processes:

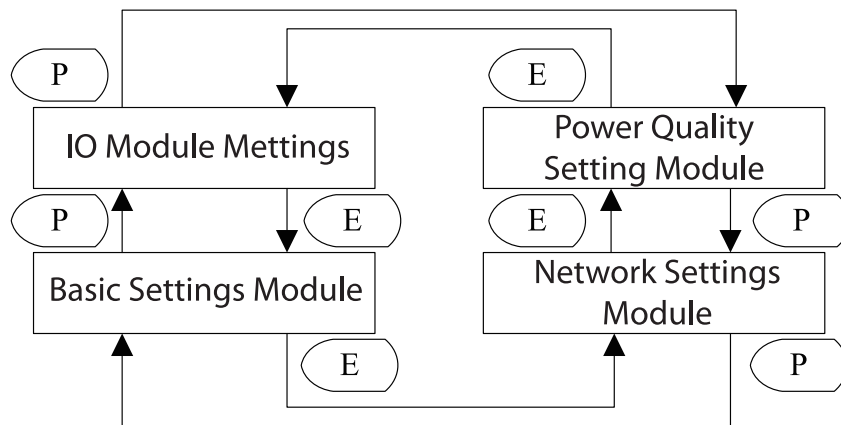


Fig 3-15 Settings Key Module Operation Flowchart

Setting module selection screen, as shown in Fig 3-16. Select the function to be set at this interface. The first digital district I/O (I/O settings); the second line shows the sys (System basic settings); the third row shows nEt (network settings is not supported); The fourth line shows pq (power quality setting).

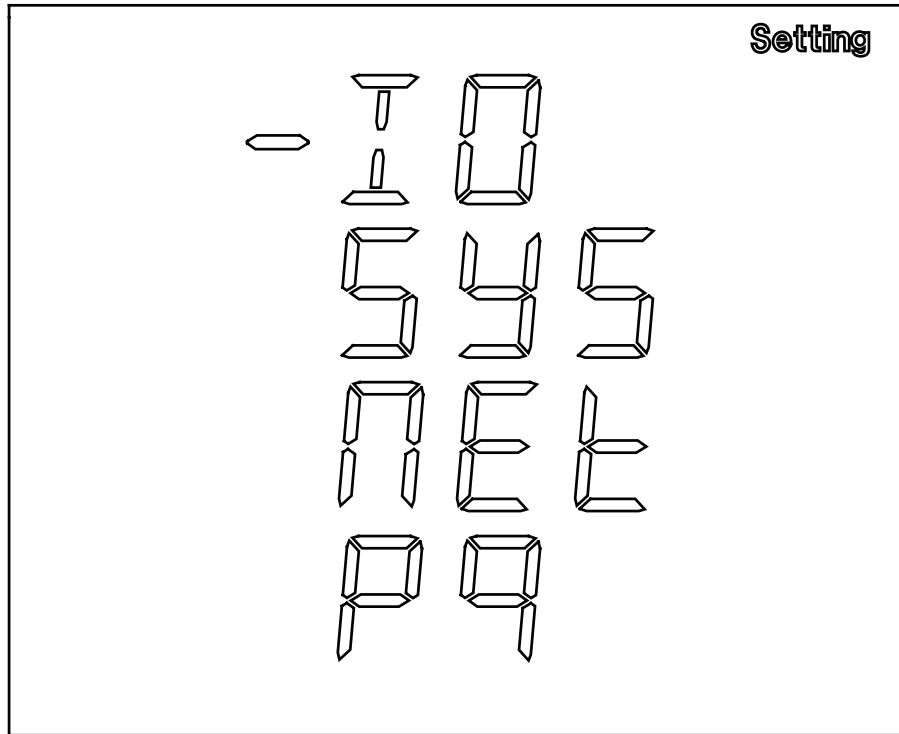


Fig 3-16 Interface Module Selection

Note: BL only supports I/O and SYS settings; CL only supports I/O, SYS and net set EL supports all setup functions.

3.6.2 System Basic Setting Module

Press H, back to parameter selection mode.

The screen will roll to the next page each time when press E and will roll back to the first page when press E at the last page.

The screen will roll to the last page each time when press P and will roll back to the last page when press P at the first page.

Press V/A, confirm the parameter you want to modify, enter the modify mode. Basic Settings module key operation flow chart shown in Fig 3-17:

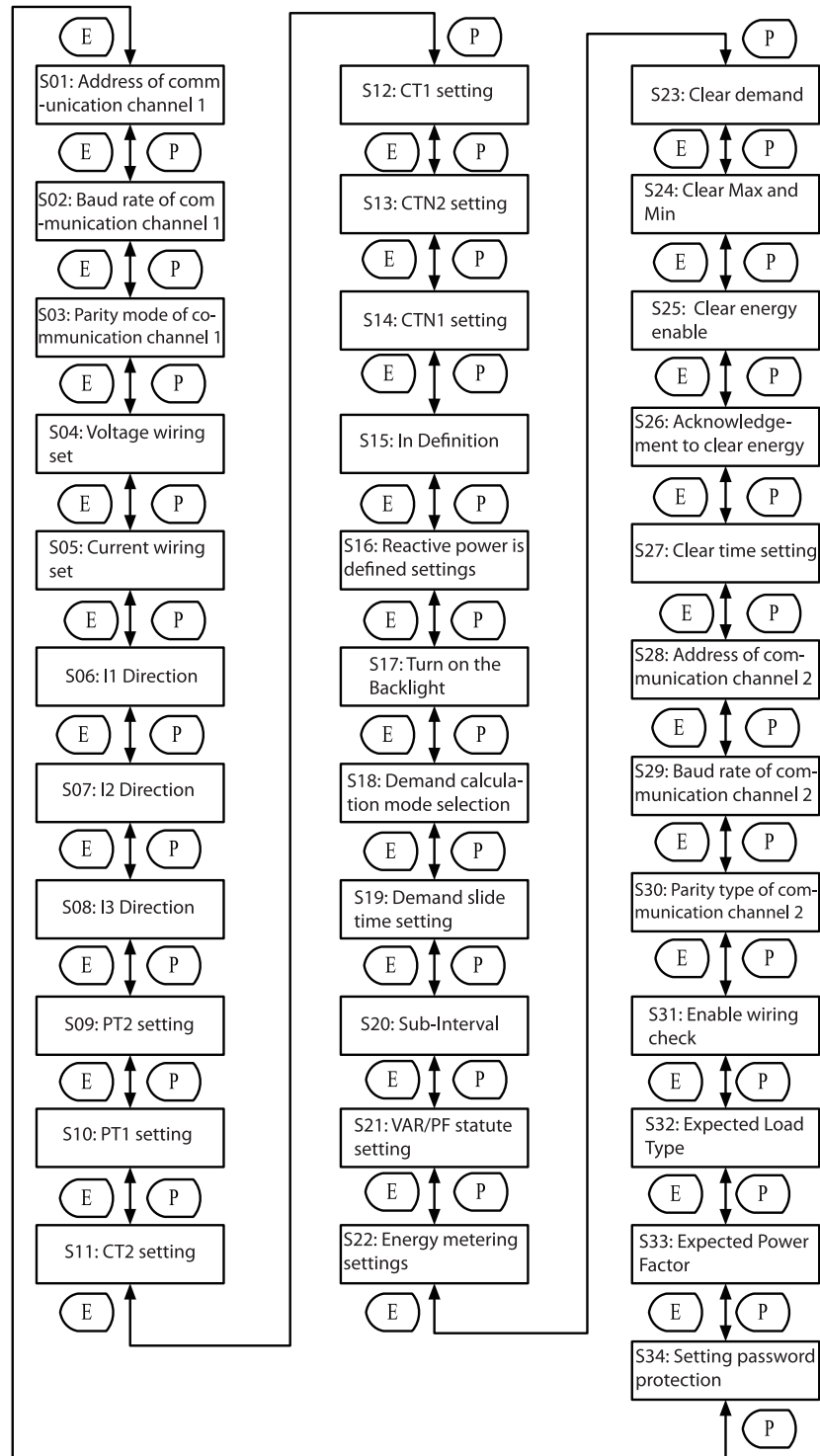


Fig 3-17 Basic Settings Module Key Operational Processes

Note: BL does not support the communication-related settings

3.6.3 I/O Interface Settings and Key Operations

I/O setting interface key operation flow chart shown below.

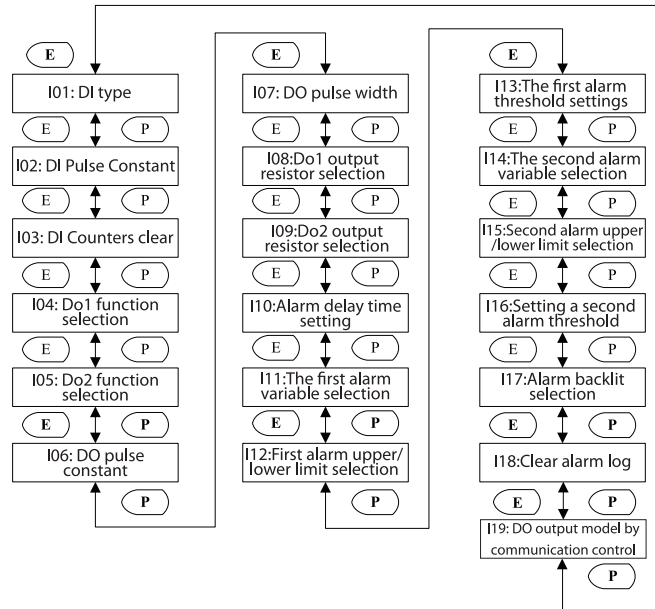


Fig 3-18 I/O Module Settings Key Operation Flowchart

Note: The Acuvim-BL does not support DI settings.

Press H, back to parameter selection mode.

The screen will roll to the next page each time when press E and will roll back to the first page when press E at the last page.

The screen will roll to the last page each time when press P and will roll back to the last page when press P at the first page.

Press V/A, confirm the parameter you want to modify, enter the modify mode.

3.6.4 Power Quality Settings Button and Page Display

The power quality setting key operation process is shown below:

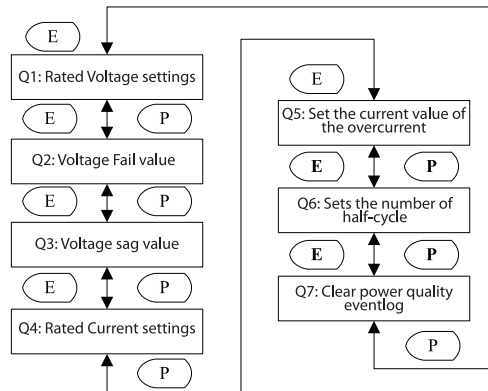


Fig 3-19 Power Quality Module Flip Operation

Press H to go back to the parameter selection mode.

The screen will roll to the next page each time when press E and will scroll back to the first page when E is pressed at the last page.

The screen will scroll to the last page each time when P is pressed and will scroll back to the last page when P is pressed at the first page.

Press V/A to confirm the parameter you want to modify and to enter the modify mode.

3.7 System Information Interface

In the system information module, the displayed content includes version information, device clock, hardware version and software version, and so on.

In any interface, press E and V/A simultaneously to enter the system information module.

| Module Name | Display Interface |
|------------------------|------------------------------------|
| Time Information | System Clock |
| | Total running time of the meter |
| | Load running time |
| | Meter running time |
| Result of Wiring Check | Voltage phase loss |
| | Voltage wiring error |
| | Current wiring error |
| | Reverse current |
| System Information | Meter type and version information |
| | State seal |
| DI counter/state | DI1 counter/state |
| | DI2 counter/state |
| | DI3 counter/state |
| | DI4 counter/state |

Press the V/A key to display the system clock. The screen will scroll to the next page each time you press the V/A key and will go back to the first screen if you press V/A at the last screen.

Press the P key to display the result of the wiring check. The screen will scroll to the next page each time you press the P key and will go back to the first screen if you press P at the last screen.

Press the E key to display system information. The screen will scroll to the next page each time you press the E key and will go back to the first screen if you press E at the last screen.

Press H key to display the DI counter. The screen will scroll to the next page each time you press the H key and will go back to the first screen if you press H at the last screen.

Time information module key operation process is shown below:

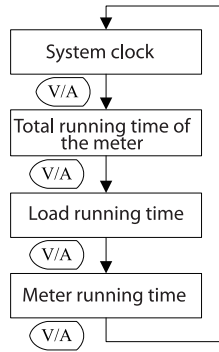


Fig 3-20 Time Information Key Operation

The following figure shows the system time. As shown in Fig 3-21, the time is 2015-12-10 15:24:27.

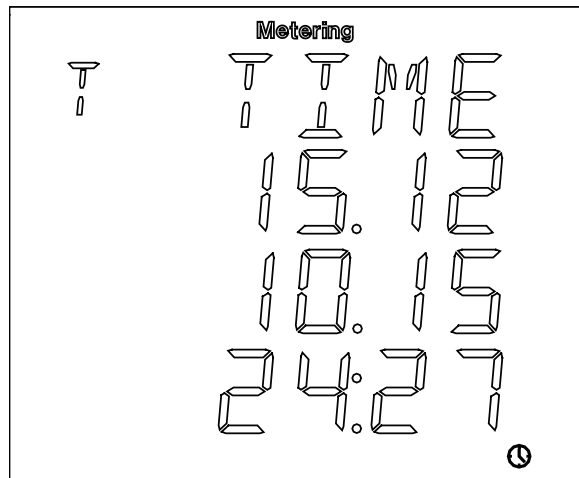


Fig 3-21 System Time Display

The following figure shows the running time, the range of running time is 0 ~ 9999999.99 hours. As shown in Fig 3-22, the running time is 3156879.01 hours.

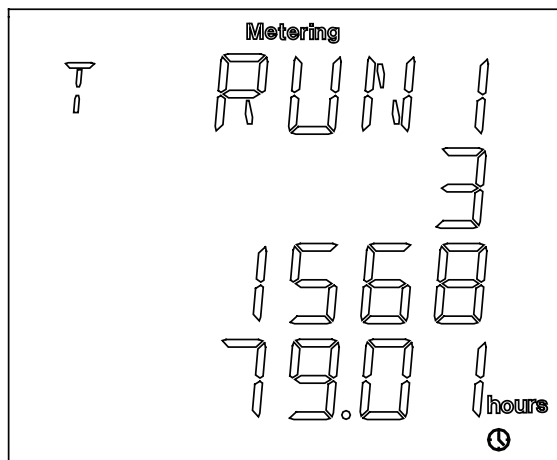


Fig 3-22 Meter Run Time Display

The following figure shows the load time where the range of load time is 0 ~ 9999999.99 hours. As shown in Fig 3-23, the displayed time is 1267834.87 hours.

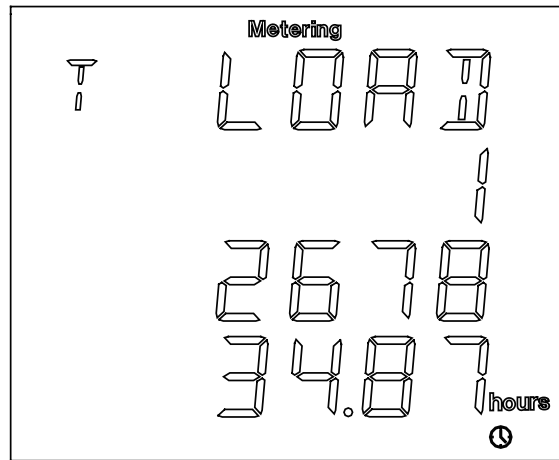


Fig 3-23 Load Running Time Display

3.7.1 Result of Wiring Check

The following figure shows how it scrolls.

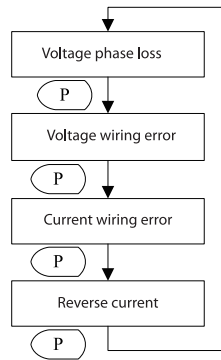


Fig 3-24 Wiring Judgment Result Shows the Key Processes

The following figure shows the result of wiring check about the phase voltage loss. As shown in Fig 3-25, B phase and C phase loss voltage.

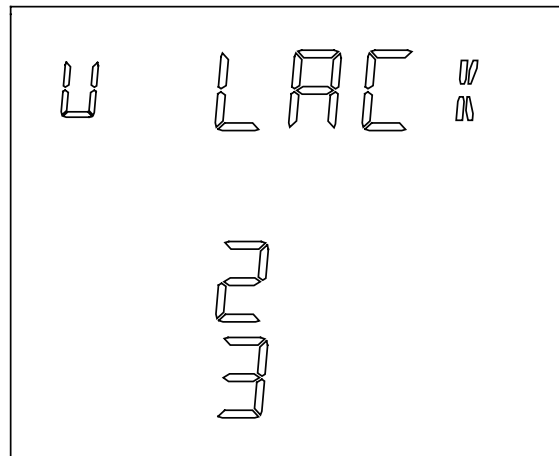


Fig 3-25 B Phase and C Phase Loss

3.7.2 System Information

The version information module key operational processes is shown below.

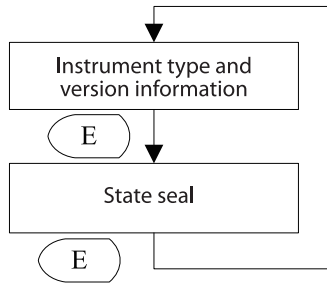


Fig 3-26 System Information Key Operation

Instrument type and version information display interface is shown below. The first line shows the type of meter, the first two letters indicate the type of meter is displayed or rail type, PF display indicates the displayed type; the third character represents the CT type, 0: 5A, 1: 1A, 2: 333mV type, 3: Rope-CT type, 4: 200mA type; 5: 6.68mA type. the fourth character represents the meter type, 2: BL, 3: CL, 5: EL. The second line shows the hardware version, the third line shows the software version. The fourth line no display. Displayed interface shown in Fig 3-27. The figure represents the information, display type -333mV type - EL meter, hardware version 3.01 software version 3.01.

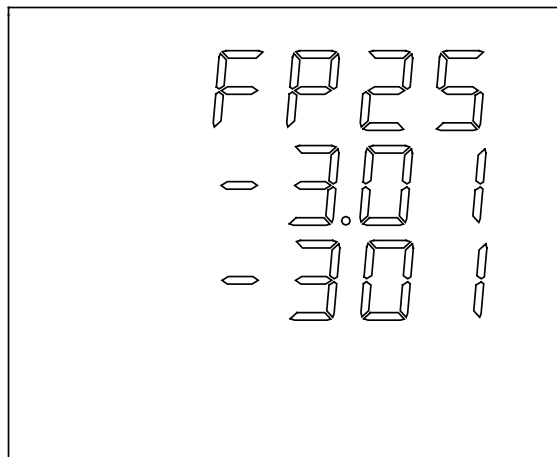


Fig 3-27 Version Information Display Interface

The seal status page is shown below. When “OPEn” is shown on the display, it indicates that the seal is opened. When “seal” is shown on the display, it indicates that the seal is closed.

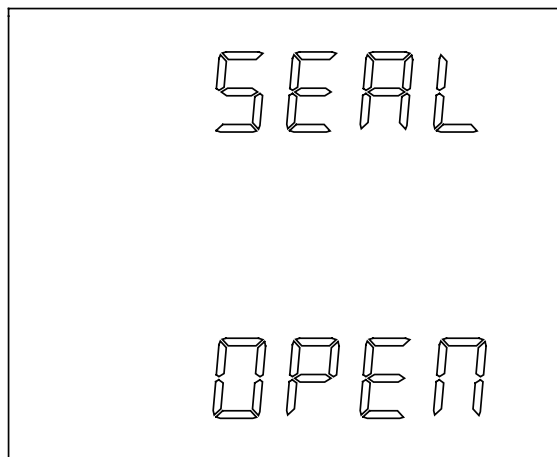


Fig 3-28 Seal Status Display

3.7.3 DI Count/State Display

The first line displays the name of DI, DI1 ~ DI4; the second, third, and fourth lines display DI counting the number of display range 0 ~ 4294967295, or the state of the DI (ON/OFF).

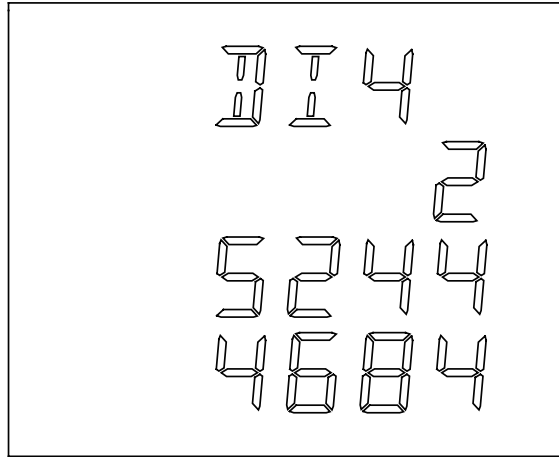


Fig 3-29 DI Count Display

3.8 Page Recovery Function

Acuvim-L has the page recovery function, which means that the meter stores the current display page in the non-volatile memory when powered off and reloads the page when the power recovers.

Chapter 4: Function and Software Tools

The Acuvim-L is a very powerful instrument that can measure almost all the parameters in the power system. Some of its advanced functionality cannot be controlled by simply pressing the keys, so we made this software to go with it. For clarity, we'll introduce functions with the help of the software interface in this chapter. The version of the software you get may be more advanced or somewhat differ from what is shown in this manual. For best results, please refer to the specific manual that accompanied your instrument.

4.1 Basic Analog Measurements

Acuvim-L can measure voltage, current, power, frequency, power factor, demand, and other parameters with high accuracy, shown as below:

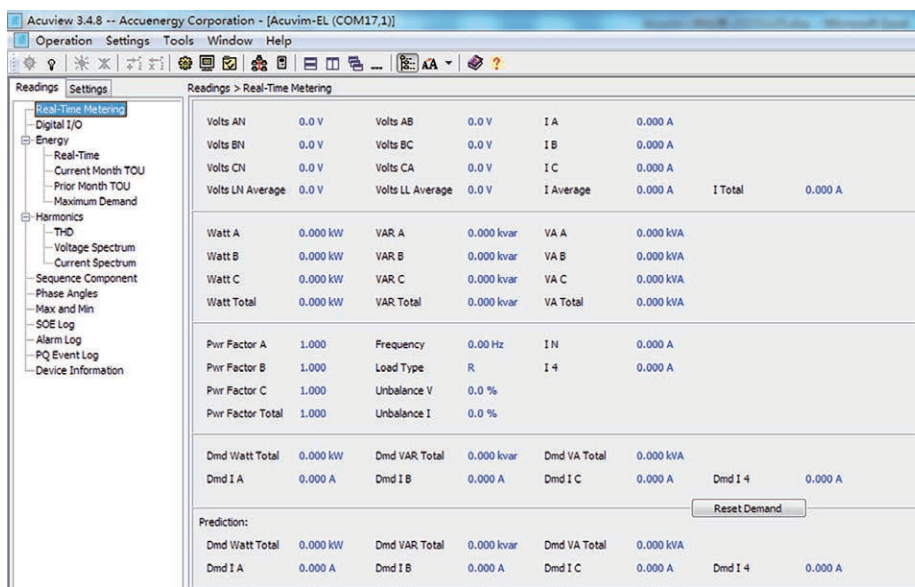


Fig 4-1 Basic Measurement Parameter Display Interface

In this interface, users can view real-time observations of various measurements, such as phase voltage, line voltage, current, active power, reactive power, apparent power, power factor, demand-related parameters, and so on.

Ensuring parameters are correctly configured is critical to obtaining accurate measurements. The settings page is shown in Fig 4-2.

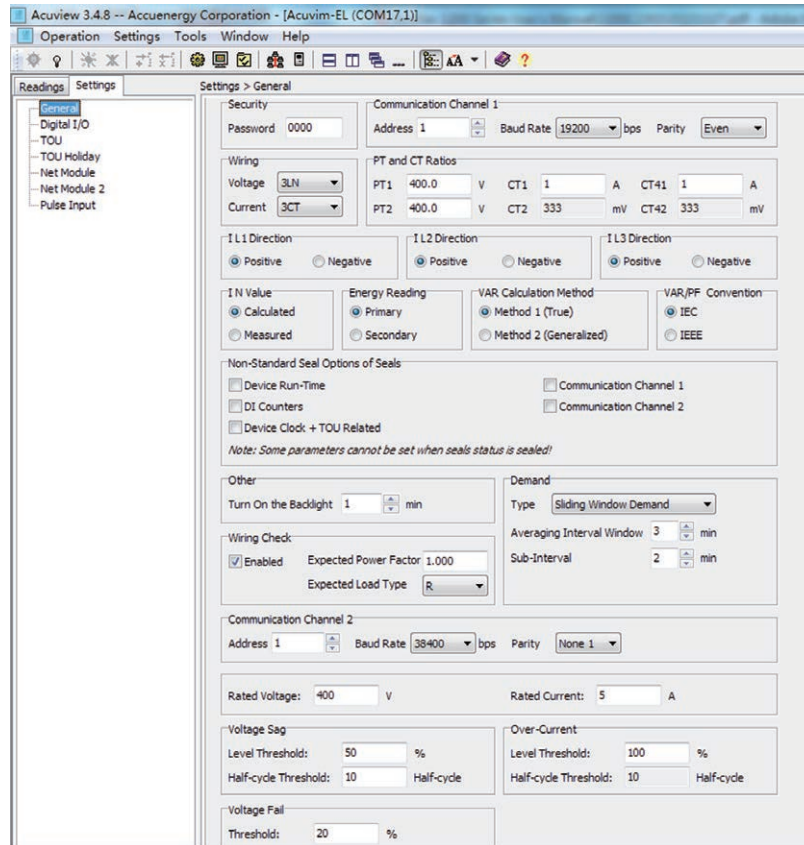


Fig 4-2 Basic Set of Software Tools Display Parameters

We would like to introduce how to configure demand, energy, and current direction settings.

1. Demand

Types of Demand calculated in Acuvim-L are: Sliding Window Demand, Fixed Window Demand, Rolling Window Demand, and Thermal Demand.

a. Sliding Window Demand

Select an interval from 1 to 30 minutes, which is the period of the calculation. The demand updates every 1 minute as the window slides.

b. Fixed Window Demand

Select a period time from 1 to 30 minutes, which is the period of the calculation. The demand updates once during the time period.

c. Rolling Window Demand

Select a period time from 1 to 30 minutes, which is the period of the calculation. Select an interval time, which is the rolling time. The rolling time must be a multiple of the interval time. The demand updates at the end of the rolling time.

d. Thermal Demand

Thermal demand method calculates the demand based on a thermal response which mimics the thermal demand meter. Select the period for the calculation and the demand updates at the end of each period.

2. Energy

Various kinds of energy will accumulate in the Acuvim-L. Real time energy: the accumulation of energy for the kWh, kVAh and kVAh since the last time it was cleared.

a. There are two ways to calculate reactive energy (power): $Q = \sqrt{S^2 - P^2 - D^2}$

Mode 0: real reactive energy: $Q = \sqrt{S^2 - P^2}$

Mode 1: General reactive energy:

b. User can choose primary energy or secondary energy by pressing a key or via communication.

Note:

1. The energy will be reset when user switches the mode of energy calculation (primary energy or second energy) and then start to accumulate the energy again.
2. Degree in electrical Acuvim-L series meter display is divided into primary energy or secondary energy, however, the degree of electrical pulses via I/O module output of only the secondary energy power pulse.
3. Current Direction Adjustment

The normal current direction is from port 1 to port 2, but sometimes a wiring error may occur. To adjust the direction of current, the three current directions can be set as "Negative," which means reversing 180 degrees, and "Positive," which means normal. It is easy to get the right data without changing the wiring.

4.2 Max/Min

| Channel | Maximum | Time Stamp | Minimum | Time Stamp |
|---------------------|------------|---------------------|-------------|---------------------|
| Volts AN | 520.3 V | 2001-01-01 00:52:56 | 0.0 V | 2015-12-14 22:49:49 |
| Volts BN | 520.3 V | 2001-01-01 00:52:56 | 0.0 V | 2015-12-14 22:49:49 |
| Volts CN | 520.4 V | 2001-01-01 00:52:56 | 0.0 V | 2015-12-14 22:49:49 |
| Volts AB | 1.041 kW | 2001-01-01 00:52:56 | 0.0 V | 2015-12-14 22:49:49 |
| Volts BC | 820.0 V | 2001-01-01 00:25:18 | 0.0 V | 2015-12-14 22:49:49 |
| Volts CA | 901.5 V | 2001-01-01 00:52:56 | 0.0 V | 2015-12-14 22:49:49 |
| I A | 10.05 A | 2018-01-01 03:24:24 | 0.000 A | 2015-12-14 22:49:50 |
| I B | 10.05 A | 2018-01-01 03:25:06 | 0.000 A | 2015-12-14 22:49:50 |
| I C | 7.050 A | 2001-01-01 00:03:10 | 0.000 A | 2015-12-14 22:49:50 |
| I 4 | 5.417 A | 2001-01-01 00:52:56 | 0.000 A | 2015-12-14 22:49:50 |
| Watt Total | 8.816 kW | 2018-01-01 02:21:49 | -4.404 kW | 2018-01-01 03:03:59 |
| VAR Total | 4.257 kvar | 2018-01-01 03:27:02 | -3.871 kvar | 2018-01-01 04:43:09 |
| VA Total | 8.816 kVA | 2018-01-01 02:21:49 | 0.000 kVA | 2015-12-14 22:49:49 |
| Pwr Factor Total | 1.000 | 2015-12-14 22:42:37 | -1.000 | 2018-01-01 02:52:18 |
| Frequency | 65.00 Hz | 2001-01-01 00:04:26 | 0.00 Hz | 2015-12-14 22:49:49 |
| Unbalance V | 100 % | 2001-01-01 01:01:07 | 0.0 % | 2015-12-14 22:42:37 |
| Unbalance I | 100 % | 2001-01-01 01:07:49 | 0.0 % | 2015-12-14 22:42:38 |
| THD Volts AN/AB | 39.52 % | 2001-01-01 00:52:01 | 0.00 % | 2015-12-14 22:42:37 |
| THD Volts BN/CA | 41.66 % | 2001-01-01 00:51:25 | 0.00 % | 2015-12-14 22:42:37 |
| THD Volts CN/BC | 39.51 % | 2001-01-01 00:51:25 | 0.00 % | 2015-12-14 22:42:37 |
| THD I A | 99.47 % | 2001-01-01 00:08:50 | 0.00 % | 2015-12-14 22:42:37 |
| THD I B | 39.75 % | 2001-01-01 00:30:14 | 0.00 % | 2015-12-14 22:42:37 |
| THD I C | 39.71 % | 2001-01-01 00:30:26 | 0.00 % | 2015-12-14 22:42:37 |
| THD I 4 | 39.71 % | 2001-01-01 00:29:44 | 0.00 % | 2015-12-14 22:42:37 |
| Watt Total (Demand) | 5.999 kW | 2001-01-01 00:54:03 | -- | -- |
| VAR Total (Demand) | 3.394 kvar | 2018-01-01 22:25:56 | -- | -- |
| VA Total (Demand) | 6.074 kVA | 2001-01-01 00:53:03 | -- | -- |

Fig 4-3 Statistics Display

Acuvim-L can make statistics of the maximum and minimum values of phase/line voltage, currents, power, reactive power, apparent power, power factor, frequency, demand, unbalance factor, THD as well as the time they occur. All the data will be stored in non-volatile memory so that they will not be lost when the power supply is off. All the data can be accessed or be cleared via communication and by panel keys except for time stamps.

4.3 Harmonics and Power Quality Analysis

1. Harmonics

Acuvim-L can measure and analyze THD, Harmonics (2nd to 31st for BL/CL, 2nd to 63rd for EL), even harmonics, odd harmonics, Crest Factor, THFF, K factor, and other parameters. They are shown in Fig 4-4.

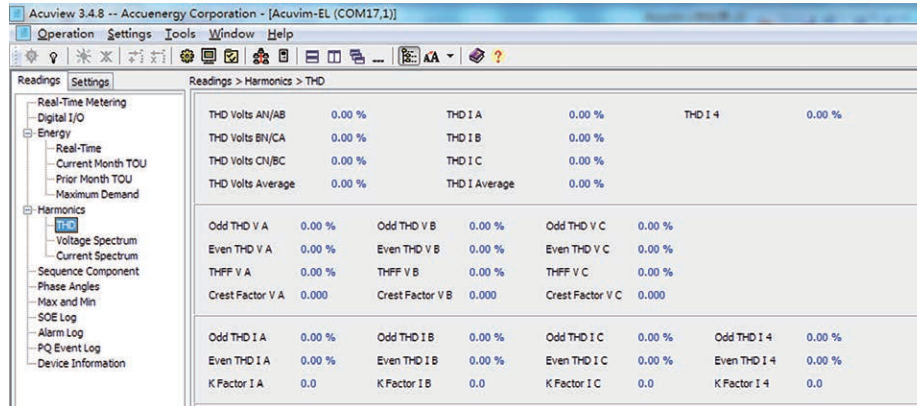


Fig 4-4 Power Quality Display Interface

2. Phase Angle

Phase angle indicates the angle between U1 and other voltage and current parameters. It ranges from 0 to 360 degrees. This function is to help user find out the relationship between all input signals to avoid wiring errors. When it is set to "2LL" or "3LL", it gives out the phase angle of Ubc, Uca, i1, i2, i3 corresponding to Uab and Ub, Uc, i1, i2, i3 corresponding to u1 for other settings. They are show in Fig 4-5.

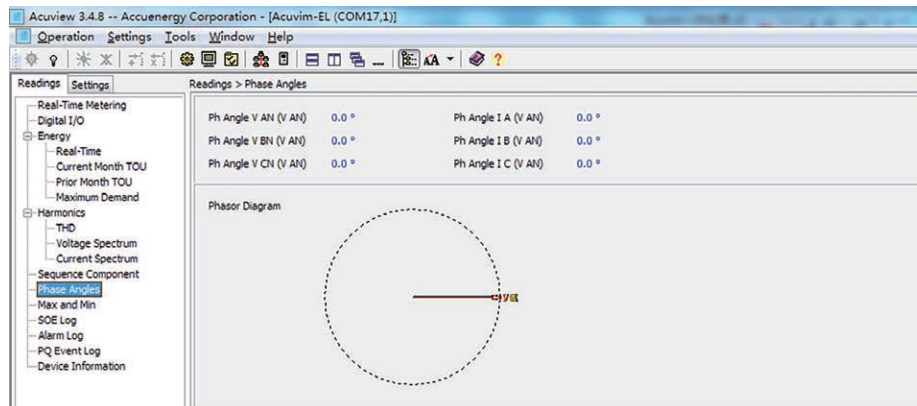


Fig 4-5 Phase Angle Display Interface

3. Sequence Component and Unbalance Analysis

Acuvim-L will perform sequential analysis for the input signal. It makes out the positive sequence, negative sequence, and zero sequence of the fundamentals and does the unbalance analysis of voltage and current. They are shown in Fig 4-6.

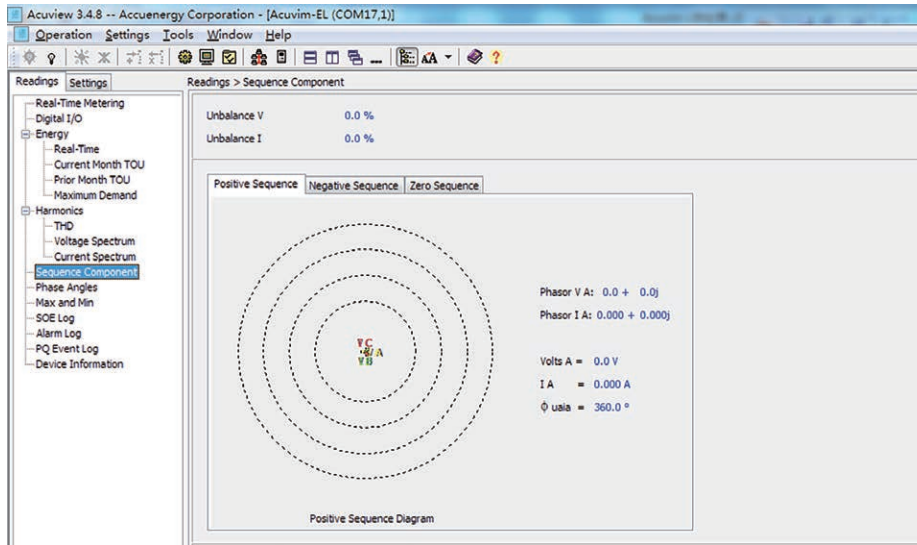


Fig 4-6 Sequence Component Display Interface

4.4 Extended I/O Module

The Acuvim L can read the digital status, pulse counter and relay status using extended IO modules. These readings can be viewed on the Acuvim software as shown in Fig 4-6-a.

From the software users can control the relay (ON/OFF) if configured in “Remote Control” mode and can also reset the Digital Input Counters.



Fig 4-6-a

The I/O settings are configurable from the software as shown in Fig 4-6-b. Users can change the IO mode settings for the digital output as Energy pulse, Alarm Output, Remote Control. If energy pulse mode is selected energy type, pulse width and pulse constant can be configured. If alarm mode is selected, the parameter type, over/under condition, setpoint value and delay for the alarm is configurable.

The digital input mode can also be configured as State or Counter, if counter is selected the DI pulse constant can be set.

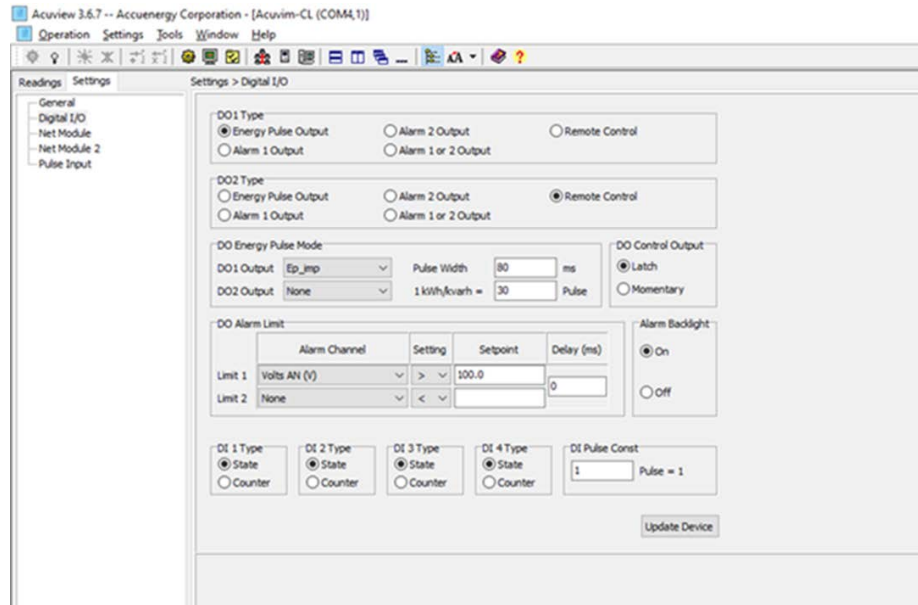


Fig 4-6-b

4.5 Extended Communication Block

Communication channel 1 is support the Modbus RTU protocol. Please refer to “Chapter 5 Communication” for Modbus RTU protocol.

Communication channel 2 is supported for the Ethernet module, PROFIBUS module, and second RS-485 module. There is no difference between communication channel 1 and a second RS-485 module. Please refer documentation for the L-WEB module and PROFIBUS module for more information.

4.6 TOU Block

User can assign up to 4 different tariffs (sharp, peak, valley, and normal) to different time periods within a day according to the billing requirements. The meter will calculate and accumulate energy to different tariffs according to the meter’s internal clock timing and TOU settings.

TOU setting: User can set a maximum of 12 TOU seasons where each season can be assigned to a TOU schedule (a maximum of 14 TOU schedules are available). Each schedule can be divided up into 14 segments in which each segment can have its own tariff.

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 setting format requirement” for details). 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 begin.

TOU Setting Format Requirement:

1. Season setting parameter: The calendar year will be divided up into different seasons depending on the season setting parameter. The parameter can be selected from any integer from 1 to 12. Users must enter the correct value for the season setting parameter in accordance with the TOU season table. If the season setting parameter is set as 2, the first 2 slots of the TOU season table must be set, otherwise it will be considered an invalid input and the TOU function will be disabled.
2. TOU season format: Enter the start date into the TOU season table slot following this format “MM-DD ID” - MM stands for the month, DD stands for the day and ID stands for the TOU schedule ID (available from 01 to 14). The dates should be organized so that they are in sequence according to the calendar year (the earlier date comes first, and the later date comes last). For example, if 3 seasons are selected, the date parameters are January 1, June 6 and September 7, and TOU schedule 02, 01, 03 will be used respectively, the first TOU season table slot shall enter 01-01 02, the second slot shall enter 06-06 01, and the third slot shall enter 09-07 03. Entering 01-01 02 for the first slot, 09-07 03 for the second slot and 06-06 01 for the third slot is considered invalid.
3. Schedule setting parameter: The number of available TOU schedules depends on the schedule setting parameter. The parameter can be selected from any integer between 1 to 14. This parameter determines the number of TOU schedules available for the TOU calendar setting. A maximum of 14 TOU schedules (from TOU Schedule #1 to TOU Schedule #14) can be used.
4. Segment setting parameter: Each TOU schedule consists of various timing segments. The number of segments depends on the segment setting parameter setup. The parameter can be selected from any integer during 1 to 14(inclusively). User must enter the correct value for the segment setting parameter in accordance with the TOU schedule table. If the segment setting parameter is set as 3, the first 3 slots of the TOU schedule table must be set, otherwise, it will be considered as an invalid input (TOU function will be disabled).
5. TOU schedule format: Each TOU schedule represents a 24-hour cycle. Similar to the TOU season format, enter the start time into the TOU schedule table slot following this format “HH:MM ID” - HH stands for hour (in 24-hour format), MM stands for minutes, and ID stands for tariffs (available from 00 to 03). The time should be organized according to the hour sequence. For example, if 3 segments are selected, timing parameters are 01:00, 15:30, 22:45, the order of the 3 segments should be one of the following: 01:00, 15:30, 22:45 or 15:30, 22:45,01:00 or 22:45, 01:00, 15:30 Entering time information in the wrong sequence (for example, entering 15:30, 01:00, 22:45) is considered as an invalid operation and the TOU function will be disabled.
6. Tariff setting parameter: This parameter corresponds to the number of tariffs available for the TOU calendar and can be selected from any integer from 0 to 3. The four tariffs: sharp, peak, valley, and normal are represented by 4 integers: 0,1, 2 and 3 respectively. If the tariff setting parameter is set to 3, all of the 4 tariffs will be available for the TOU calendar; if the parameter is set to 1, only the first 2 tariffs (sharp and peak) will be available.
7. Holiday setting parameter: This parameter can be set from any integer between 1 and 30, meaning a maximum of 30 holidays can be programmed to the TOU calendar. If the holiday setting parameter is set as 3, the first 3 slots of the holiday schedule must be set, otherwise it will be considered as an invalid input (TOU function will be disabled).
8. Holiday schedule: The holiday schedule uses the same format as the TOU seasons “MM-DD ID”. User can select which TOU schedule to be used for the holiday. The dates of the holiday schedule do not need to be organized in a sequential order (i.e., the first slot can be January 1, the second slot can be December 26 and the third slot can be December 25).

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

Daylight saving time (DST): when DST is enabled, if you choose the fixed date option, you set a fixed date for DST where the format is month/ day / hour / minute / adjust the time (in minutes). If you choose the non-fixed data option, you set a day in a week for DST where the format is month / which week/ day / hour /minute / adjust time (in minute). Once DST is enabled, DST will be automatically implemented by the chosen option.

When the clock runs to the start of DST, the meter will automatically adjust the clock for a settable time period in advance. When the clock runs to the end of DST, the meter will automatically adjust the clock back for a settable time period.

Daylight Saving Time

DST Enable DST Format Format 2

Format 1

DST Start
Feb 28 Day 23 Hour 0 Min Adjust Time 60 Minutes

DST Ending
Mar 22 Day 15 Hour 16 Min Adjust Time 30 Minutes

Format 2

DST Start
Nov 1st Tue at 22 : 10 Adjust Time 10 Minutes

DST Ending
Dec 2nd Mon at 23 : 0 Adjust Time 30 Minutes

Fig 4-7 Daylight Saving Time Setting Interface

TOU Holidays Function: Ten Years Holiday Setting

In this setting, users can program holidays in the future decade. The format is month / day, holiday code.

When "Enable Holiday Years Settings" is checked, users can click "Make Holiday Settings (10 Year)" to enter the holiday table setup page. Once the setup is done, users can click "Generate", by which a holiday table for the next decade can be generated.

Enable Holidays Years Settings

Start Year 2010 Ending Year 2019

1st Year Holidays

| | | | | | | | |
|----|----------|----------|----------|----------|----------|----------|----|
| 1 | 01-01 01 | 02-02 02 | 03-08 03 | 04-08 04 | 05-05 05 | 06-07 06 | 6 |
| 7 | 07-07 07 | 08-08 08 | 09-12 09 | 10-11 10 | 11-11 11 | 12-13 12 | 12 |
| 13 | 05-07 02 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 18 |
| 19 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 24 |
| 25 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 30 |

Settings Year 2010 Holiday Number 13

2nd Year Holidays

| | | | | | | | |
|----|----------|----------|----------|----------|----------|----------|----|
| 1 | 02-02 02 | 03-07 03 | 04-07 04 | 05-05 05 | 06-06 06 | 08-08 08 | 6 |
| 7 | 09-11 09 | 10-10 10 | 11-17 11 | 12-12 12 | 01-14 13 | 02-16 14 | 12 |
| 13 | 03-10 01 | 04-17 02 | 05-16 03 | 06-16 04 | 07-06 05 | 08-29 06 | 18 |
| 19 | 09-30 07 | 10-15 08 | 04-10 02 | 03-17 06 | 05-09 02 | 07-01 03 | 24 |
| 25 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 30 |

Settings Year 2011 Holiday Number 24

3rd Year Holidays

| | | | | | | | |
|----|----------|----------|----------|----------|----------|----------|----|
| 1 | 02-02 02 | 03-05 03 | 04-05 04 | 04-08 04 | 06-06 06 | 08-08 08 | 6 |
| 7 | 09-09 09 | 10-15 10 | 11-15 11 | 12-12 12 | 01-16 13 | 03-10 01 | 12 |
| 13 | 04-22 02 | 05-21 03 | 06-14 04 | 07-06 05 | 08-28 06 | 10-15 08 | 18 |
| 19 | 01-15 09 | 03-15 06 | 10-02 07 | 05-08 02 | 05-07 06 | 03-08 08 | 24 |
| 25 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 00-00 00 | 30 |

Settings Year 2012 Holiday Number 24

Fig 4-8 Setting the Interface Holidays

Weekend Schedule: Weekend Setting (bit0: Sunday; bit1 ~ bit6: Monday to Saturday; bit 0 means not effective, bit 1 means effective). For example, when the Weekend setting bit0 is 1, it means Sunday is effective. When the Weekend setting bit1 is 1, it means Monday is effective. For example, if a user wants to set Saturday and Sunday effective, 65 (1000001) should be entered into the Weekend setting field. When the meter clock is within the pre-set Weekend Schedule, the energy will accumulate under the tariff that corresponds to the Schedule.

Note: The holiday schedule has the highest priority among all the schedules followed by the Weekend Schedule. That is, when set appropriately, holiday and weekend schedules override normal (weekday) TOU settings. When a holiday falls in a weekend, the holiday schedule overrides the Weekend Schedule.

Record and Clear of Maximum Demand

Acuvim-EL can record the maximum power and current demand under different tariffs, when the TOU Function is enabled and the setting of time table is correct. It also can clear the value under different tariffs.

There are two ways of resetting Current Month TOU:

1. End of Month: This is the default method. All values from Current Month TOU will be copied over to Prior Month TOU at the very beginning of each month (the first day of each month at time 00:00:00). Current Month TOU will be cleared and reset to 0.
2. Assign: User can select the time when the values from Current Month TOU should be copied over to Prior Month TOU. User can set the time in the following format "DD HH:MM:SS" - DD stands for day, HH stands for hour, MM stands for minute, SS stands for second. Similar to the previous method, once Current Month TOU is transferred to Prior Month TOU, all values from Current Month TOU will be cleared and reset to 0.

4.7 Daily Energy

The meter stores the current energy parameter at 00:00:00. The parameters of energy are stored including Ep_imp, Ep_exp, Ep_total, Ep_net, Ep_q1, Ep_q2, Ep_q3, Ep_q4, Eq_imp, Eq_exp, Eq_total, Eq_net, Eq_q1, Eq_q2, Eq_q3, Eq_q4, Es_imp, Es_exp, Es_total, Es_net, Es_q1, Es_q2, Es_q3, Es_q4. Users can access the data of daily energy for the most recent 7 days. The daily energy will be cleared when clearing the Energy or switching the Primary/Secondary Energy.

4.8 Power Quality Eventlog

The Acuvim-EL has a Power Quality Eventlog function. The meter will record the time stamp and conditions when Voltage Sag, Voltage Fail, and so forth occur.

1. Power Quality Eventlog format:

Time stamp (4 word) + reason (1 word), 5 word for one eventlog.

Time stamp: W1, year – high byte, month – low byte; W2, day - high byte, hour – low byte; W3, minute - high byte, second – low byte; W4, millisecond.

Reason: W5 – the reason of the eventlog (Bit0: SAG of V1, Bit1: SAG of V2, Bit2: SAG of V3, Bit3: I1 over current, Bit4: I2 over current, Bit5: I3 over current, Bit6: V1 voltage fail, Bit7: V2 voltage fail, Bit8: V3 voltage fail, Bit9: Phase Sequence of Voltage, bit10: Phase Sequence of Current).

2. The Number of Eventlog:

There are 16 of records of power quality event to be stored. When the records are full, the meter is not to respond to the new power quality eventlog until you clear the records.

3. The Triggering Reasons:

a. Voltage SAG

There is a phase voltage SAG eventlog record when one phase voltage is lower than the setting value (rated voltage * level threshold of voltage sag). The meter will not respond to the voltage sag again as long as one phase voltage sag, until all phase voltages return to normal.

b. Voltage Fail

There is a phase voltage fail eventlog record when one phase voltage is lower than the setting value (rated voltage * level threshold of voltage fail). The meter will not respond to the voltage failure again as long as one phase voltage has failed, until all the phase voltages return to normal.

c. Over Current

There is a phase over current eventlog record when one phase current is upper than the setting value (rated current * level threshold of overcurrent). The meter will not respond to the over current again as long as one phase current is over current and until all the phase currents return to normal.

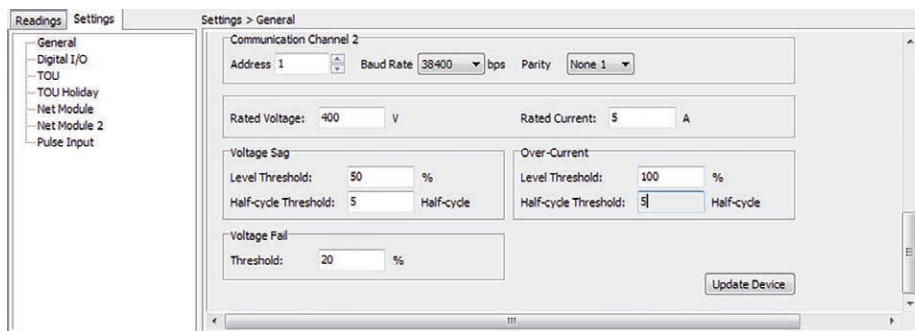


Fig 4-9 Power Quality Setting Interface

Note: The voltage sag and voltage fail share a common rated value. The voltage sag, voltage fail and over current share the common Half-cycle threshold.

Note: The function of power quality eventlog is available for 3LN wiring. Meters configured for Rope-CTs do not support the power quality eventlog.

4.9 Over-Range Alarming

In Acuvim-L, when the metering data is over the pre-setting limit and over pre- setting time interval, the over limit alarming will be picked up. The over limit value and time stamp will be recorded, and the maximum number of records is 16. The digital output (DO/RO) can be used (if extended I/O Module is connected) as trigger to light or sound alarming.

To use the over-range alarming function, you should finish all the settings (equation or inequation or enable switches) correctly, or it will fail. All the settings are to write their corresponding registers via communication as shown in Fig 4-10.

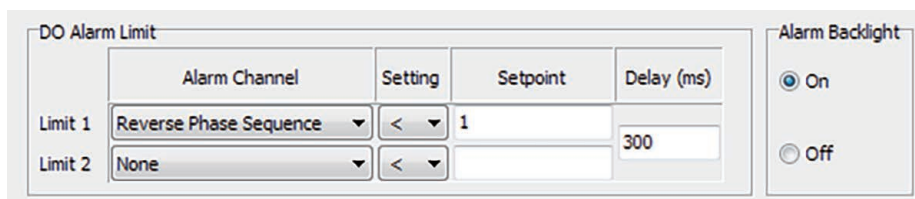


Fig 4-10 Alarm Settings Interface

Single Alarming Setting

Parameter code: Used to select a parameter for this group. For example:0- frequency. Then this parameter will be monitored.

Comparison mode: set alarming condition (larger, smaller). For example: if we choose frequency, larger, and setting value is 50, then it will alarm when the frequency is larger than 50Hz.

Delay time: if the alarm condition lasts for a specified time period, an alarm will be valid and recorded. It ranges from 0 to 76500ms (unit: 300ms). For example, when it is set to 310, there is delay 300ms after the condition is setup.

Output: If DO/RO is connected to the alarming, when alarm happens, the DO/RO will close until all alarm outputs to DO/RO are reset.

Alarm backlight: When this option is enabled, the backlight will blink when alarm is triggered.

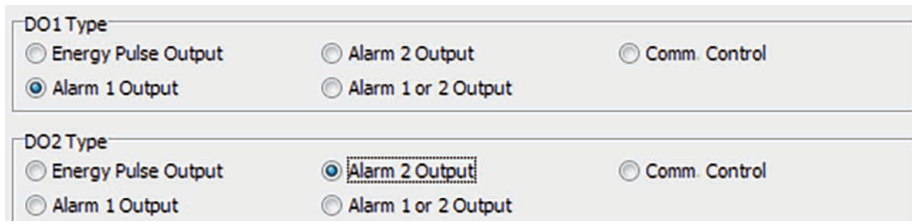


Fig 4-11 DO Output Selection Setting

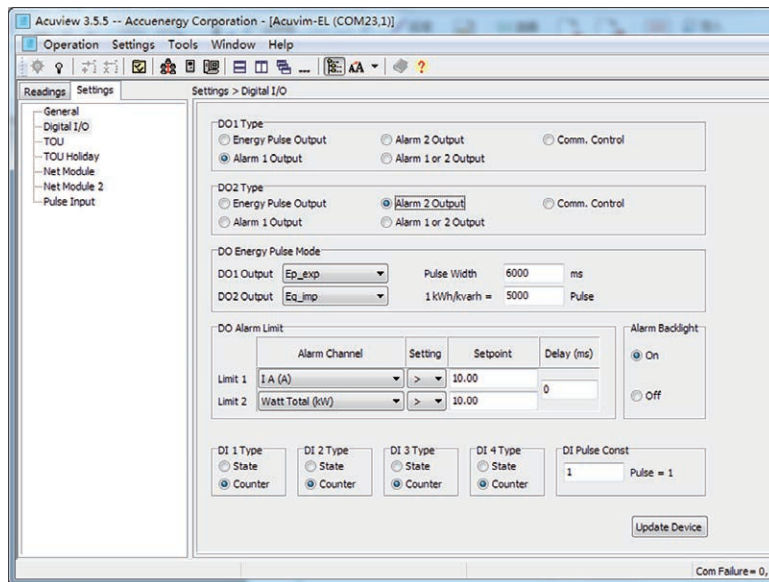


Fig 4-12 I/O Interface Settings

After single alarming setting is finished, you need to go on and finish the following global setting or the alarming will not work.

Table 4-1 indicates a group of alarming content, there are 16 groups in all with the same format.

| Address | Parameter | Property | Range |
|---------|-----------------|----------|--------|
| 3300H | High byte: year | R | 0 ~ 99 |
| | Low byte: month | | 1 ~ 12 |
| 3301H | High byte: date | R | 1 ~ 31 |
| | Low byte: hour | | 0 ~ 23 |

| Address | Parameter | Property | Range |
|---------|-----------------------------|----------|------------------------------------|
| 3302H | High byte: minute | R | 0 ~ 59 |
| | Low byte: second | | 0 ~ 59 |
| 3303H | millisecond | R | 0 ~ 999 |
| 3304H | High byte: alarming channel | R | 0: channel 1; 1; channel 2 |
| | Low byte: alarming status | | 0: reset; 1: alarm |
| 3305H | Parameter code | R | 1 ~ 51 |
| 3306H | Alarm value/ Reset value | R | Associated with the parameter code |

“Alarming status” indicates information of current alarm status. “Alarming channel” indicates the channel of the Alarming. “Parameter code” indicates which parameter is recorded.

“Alarm value/ Reset value” indicates the recorded value when alarm happens and recovers.

“Time” indicates the time stamp with the accuracy of millimeter.

There are 16 of records of alarming event to be stored, but they are not corresponding to setting records, they are recorded in cycle. The latest event will overwrite the oldest one. It begins from the 1st record when the power is turned on. When over range parameters return to normal, the time stamp and value will be recorded as well. A user can work out the duration of over range by checking the changing time.

| No. | Time Stamp | ms | Alarm Channel | Value | Status | Limit ID |
|-----|---------------------|-----|---------------------|---------|--------|----------|
| 1 | 2001-01-01 00:48:19 | 395 | Reverse Phase Se... | 126.5 ° | In | 1 |
| 2 | 2001-01-01 00:48:25 | 907 | Reverse Phase Se... | 0.0 ° | Out | 1 |
| 3 | 2001-01-01 00:55:18 | 379 | Reverse Phase Se... | 111.9 ° | In | 1 |
| 4 | 2001-01-01 00:55:19 | 506 | Reverse Phase Se... | 137.9 ° | Out | 1 |
| 5 | 2001-01-01 00:55:31 | 512 | Reverse Phase Se... | 124.3 ° | In | 1 |
| 6 | 2001-01-01 00:55:33 | 381 | Reverse Phase Se... | 149.0 ° | Out | 1 |
| 7 | 2001-01-01 00:01:28 | 377 | Reverse Phase Se... | 0.0 ° | Out | 1 |
| 8 | 2001-01-01 00:02:37 | 467 | Reverse Phase Se... | 119.9 ° | In | 1 |
| 9 | 2001-01-01 00:03:07 | 481 | Reverse Phase Se... | 0.0 ° | Out | 1 |
| 10 | 2001-01-01 00:03:18 | 886 | Reverse Phase Se... | 0.0 ° | Out | 1 |
| 11 | 2001-01-01 00:03:19 | 488 | Reverse Phase Se... | 119.9 ° | In | 1 |
| 12 | 2001-01-01 00:48:00 | 397 | Reverse Phase Se... | 151.6 ° | Out | 1 |
| 13 | 2001-01-01 00:48:06 | 399 | Reverse Phase Se... | 109.6 ° | In | 1 |
| 14 | 2001-01-01 00:48:09 | 400 | Reverse Phase Se... | 170.4 ° | Out | 1 |
| 15 | 2001-01-01 00:48:10 | 600 | Reverse Phase Se... | 111.9 ° | In | 1 |

Fig 4-13 Alarm Log Display Page

4.10 Seal

There is a different between seal meter and ordinary meter on the front panel. The seal meter has a physically seal key on the front panel. Users can physically seal the meter, similar to a utility meter, in order to provide anti-tampering protection. All metrological programming and user defined parameters are protected with a physical seal. Users can browse all protected by seal but cannot set this parameter.

There are two addresses about the seal function: 100FH and 22C1H. 100FH address: Non-Standard Seal Options of Seals.

22C1H address: the Seals Status. The Seal Status is “open” when the physically seal key is opened, or the front panel does not have the physically sealed key. The Seal Status is “sealed” when the physically seal key is closed.

The description of anti-tampering protection is as follows.

1. System Parameter Setting

Table 4-2 System Parameter Setting

| Address | Parameter | Display and Key | Communication |
|---------|-----------------------------------|-----------------|---------------|
| 1004H | Voltage Input Wiring Type | √ | √ |
| 1005H | Current Input Wiring Type | √ | √ |
| 1006H | PT1 (High 16 bit) | √ | √ |
| 1007H | PT1 (Low 16 bit) | √ | √ |
| 1008H | PT2 | √ | √ |
| 1009H | CT1 | √ | √ |
| 100AH | CT2 | √ | √ |
| 100BH | CTN1 | √ | √ |
| 100CH | CTN2 | √ | √ |
| 100DH | Definition of middle line current | √ | √ |
| 100EH | Definition of reactive power | √ | √ |
| 100FH | Nonstandard Options of The Lead | - | √ |
| 1010H | Current I1 direction | √ | √ |
| 1011H | Current I2 direction | √ | √ |
| 1012H | Current I3 direction | √ | √ |
| 1013H | Energy Calculating Mode | √ | √ |
| 1014H | Demand Calculating Mode | √ | √ |
| 1015H | Averaging Interval Window | √ | √ |
| 1016H | Sub-Interval | √ | √ |
| 1017H | VAR/PF Convention | √ | √ |
| 1018H | Demand Clear | √ | √ |
| 1019H | Energy Calculating Mode | √ | √ |
| 101AH | Energy Clear | √ | √ |

Note: "-" means that the meter doesn't have this function, "√" means that this parameter will be protected when the seal key is closed.

2. Energy

Table 4-3 Energy Settings

| Address | Parameter | Communication |
|---------------|-----------|---------------|
| 2080H ~ 2081H | Ep_imp | √ |
| 2082H ~ 2083H | Ep_exp | √ |
| 2084H ~ 2085H | Ep_total | √ |
| 2086H ~ 2087H | Ep_net | √ |
| 2088H ~ 2089H | Ep_q1 | √ |

| Address | Parameter | Communication |
|---------------|-------------------|---------------|
| 208AH ~ 208BH | Ep_q2 | √ |
| 208CH ~ 208DH | Ep_q3 | √ |
| 208EH ~ 208FH | Ep_q4 | √ |
| 2090H ~ 2091H | Eq_imp | √ |
| 2092H ~ 2093H | Eq_exp | √ |
| 2094H ~ 2095H | Eq_total | √ |
| 2096H ~ 2097H | Eq_net | √ |
| 2098H ~ 2099H | Eq_q1 | √ |
| 209AH ~ 209BH | Eq_q2 | √ |
| 209CH ~ 209DH | Eq_q3 | √ |
| 209EH ~ 209FH | Eq_q4 | √ |
| 20A0H ~ 20A1H | Es_imp | √ |
| 20A2H ~ 20A3H | ES_exp | √ |
| 20A4H ~ 20A5H | Es_total | √ |
| 20A6H ~ 20A7H | Es_net | √ |
| 20A8H ~ 20A9H | Es_q1 | √ |
| 20AAH ~ 20ABH | Es_q2 | √ |
| 20ACH ~ 20ADH | Es_q3 | √ |
| 20AEH ~ 20AFH | Es_q4 | √ |
| 20B0H ~ 20B1H | Ep_imp of Phase A | √ |
| 20B2H ~ 20B3H | Ep_exp of Phase A | √ |
| 20B4H ~ 20B5H | Ep_imp of Phase B | √ |
| 20B6H ~ 20B7H | Ep_exp of Phase B | √ |
| 20B8H ~ 20B9H | Ep_imp of Phase C | √ |
| 20BAH ~ 20BBH | Ep_exp of Phase C | √ |
| 20BCH ~ 20BDH | Eq_imp of Phase A | √ |
| 20BEH ~ 20BFH | Eq_exp of Phase A | √ |
| 20C0H ~ 20C1H | Eq_imp of Phase B | √ |
| 20C2H ~ 20C3H | Eq_exp of Phase B | √ |
| 20C4H ~ 20C5H | Eq_imp of Phase C | √ |
| 20C6H ~ 20C7H | Eq_exp of Phase C | √ |
| 20C8H ~ 20C9H | Es_imp of Phase A | √ |
| 20CAH ~ 20CBH | Es_exp of Phase A | √ |
| 20CCH ~ 20CDH | Es_imp of Phase B | √ |
| 20CEH ~ 20CFH | Es_exp of Phase B | √ |
| 20D0H ~ 20D1H | Es_imp of Phase C | √ |
| 20D2H ~ 20D3H | Es_exp of Phase C | √ |

3. DI

Table 4-4 DI Settings

| Address | Parameter | Display and Key | Communication |
|---------|-------------------|-----------------|---------------|
| 1900H | DI Type | √ | √ |
| 1901H | DI Pulse Constant | √ | √ |
| 1902H | Clear DI Counters | √ | √ |
| 1903H | Work Mode of Do1 | √ | √ |
| 1904H | Work Mode of Do2 | √ | √ |
| 1905H | Pulse Constant | √ | √ |
| 1906H | Do Pulse Width | √ | √ |
| 1907H | Do1 Energy Output | √ | √ |
| 1908H | Do2 Energy Output | √ | √ |

4. Non-Standard Seal Options of Seals:

a. Communication channel 1, when the bit0 of Non-Standard Seal Options of Seals is valid, protected the content about the communication channel 1 as follow.

| Address | Parameter | Display and Key | Communication |
|---------|-----------------------|-----------------|---------------|
| 1000H | Access code | √ | √ |
| 1001H | Communication Address | √ | √ |
| 1002H | Baud Rate | √ | √ |
| 1003H | Parity Mode | √ | √ |

b. Communication channel 2, when the bit1 of Non-Standard Seal Options of Seals is valid, protected content about communication channel 2 is described in the following table.

| Address | Parameter | Display and Key | Communication |
|------------------------|------------------------------------|-----------------|---------------|
| 1024H | Communication Address of Channel 2 | √ | √ |
| 1025H | Baud Rate of Channel 2 | √ | √ |
| 1026H | Parity Mode of Channel 2 | √ | √ |
| Ethernet Module | | | |
| 1C03H | DHCP | √ | √ |
| 1C04H | IP Address First Byte (High) | √ | √ |
| 1C05H | IP Address Second Byte (Low) | √ | √ |
| 1C06H | IP Address Third Byte (High) | √ | √ |
| 1C07H | IP Address Fourth Byte (Low) | √ | √ |
| 1C08H | Subnet Mask First Byte (High) | √ | √ |
| 1C09H | Subnet Mask Second Byte (Low) | √ | √ |
| 1C0AH | Subnet Mask Third Byte (High) | √ | √ |
| 1C0BH | Subnet Mask Fourth Byte (Low) | √ | √ |

| Address | Parameter | Display and Key | Communication |
|---------|-----------------------------------|-----------------|---------------|
| 1C0CH | Default Gateway First Byte (High) | √ | √ |
| 1C0DH | Default Gateway Second Byte (Low) | √ | √ |
| 1C0EH | Default Gateway Third Byte (High) | √ | √ |
| 1C0FH | Default Gateway Fourth Byte (Low) | √ | √ |

c. Device Run-Time, when the bit2 of Non-Standard Seal Options of Seals is valid, protected content about the device run-time is described in the following table.

| Address | Parameter | Display and Key | Communication |
|------------------------|-----------------------|-----------------|---------------|
| 101CH | Reset Total Run Time | √ | √ |
| 101DH | Reset Load Time Clear | | √ |
| 101EH | Reset Run Time | | √ |
| Ethernet Module | | | |
| 2280H | Year | - | √ |
| 2281H | Month | - | √ |
| 2282H | Day | - | √ |
| 2283H | Hour | - | √ |
| 2284H | Minute | - | √ |
| 2285H | Second | - | √ |
| 2286H | Week | - | √ |

Note: There is only one operation for three options (reset total run time, reset load time, and reset run time) by display and key.

d. DI Counters, when the bit3 of Non-Standard Seal Options of Seals is valid, protected content about the DI Counters is described in the following table.

| Address | Parameter | Display and Key | Communication |
|---------|-------------------|-----------------|---------------|
| 1902H | Clear DI Counters | √ | √ |

e. TOU Related, when the bit4 of Non-Standard Seal Options of Seals is valid, protected content about the TOU is described in the following table.

| Address | Parameter | Display and Key | Communication |
|---------|------------------------------|-----------------|---------------|
| 101FH | Enable Holiday Years Setting | - | √ |
| 1020H | Sharp Demand Clear | √ | √ |
| 1021H | Peak Demand Clear | √ | √ |
| 1022H | Valley Demand Clear | √ | √ |
| 1023H | Normal Demand Clear | √ | √ |
| 1024H | Total Demand Clear | √ | √ |

Chapter 5: Communications

This chapter will mainly discuss how to operate the meter via communication port using software. To master this chapter, you should be familiar with Modbus and read other chapters of this manual to make sure that you have a good understanding of the functions and applications of this product.

This chapter includes Modbus protocol, format of communication and data address table and Acuvim-L application details.

5.1 Modbus Protocol Introduction

Modbus-RTU protocol is used for communication in Acuvim-L series meter. Data format and error check methods are defined in Modbus protocol. The half-duplex query and respond mode is adopted in Modbus protocol. There is only one master device in the communication net. The others are slave devices, waiting to be queried by the master.

1. Transmission mode

The mode of transmission defines the data structure within a frame and the rules used to transmit data. The mode is defined in the following which is compatible with Modbus-RTU Mode*.

* Modbus is trademark of Modicon, Inc.

| | |
|----------------|--------------------|
| Coding system | 8-bit binary |
| Start bit | 1 |
| Data bits | 8 |
| Parity | NON1/NON2/ODD/EVEN |
| Stop bit | 1 or 2 |
| Error checking | CRC check |

2. Modbus Protocol

A Modbus message is placed by the transmitting device into a frame than has a known beginning and ending point. This allows receiving devices to begin at the start of the message, read the address portion and determine which device is addressed, and to know when the message is completed. Partial messages can be detected, and errors can be set as a result.

5.1.1 Framing

Table 5-1 Data Frame Format

| Address | Function | Data | Check |
|---------|----------|---------|--------|
| 8-bit | 8-bit | N×8-bit | 16-bit |

5.1.2 Address Field

The address field of a message frame contains eight bits. Valid slave device addresses are in the range of 0~247 decimal. A master addresses a slave by placing the slave address in the address field of the message. When the slave sends its response, it places its own address in this address field of the response to let the master know which slave is responding.

5.1.3 Function Field

The function code field of a message frame contains eight bits. Valid codes are in the range of 1~255 decimal. When a message is sent from a master to a slave device the function code field tells the slave what kind of action to perform.

Table 5-2 Function Code

| Code | Meaning | Action |
|------|--------------------------------|--|
| 01 | Read Relay Output Status | Obtain current status of Relay Output |
| 02 | Read Digital Input (DI) Status | Obtain current status of Digital Input |
| 03 | Read data | Obtain current binary value from one or more registers |
| 05 | Write Relay Output | Control the Relay |
| 16 | Preset multiple registers | Place specific value into a series of consecutive multiple registers |

5.1.4 Data Field

The data field is constructed using sets of two hexadecimal digits, in the range of 00 to FF hexadecimal. The data field of messages sent from a master to slave devices contains additional information which the slave must use to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field. For example, if the master requests a slave to read a group of holding registers (function code 03), the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master contains the data requested. If an error occurs, the field contains an exception code that the master application can use to determine the next action to be taken. The data field can be nonexistent (of zero length) in certain kinds of messages.

5.1.5 Error Check Field

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

5.1.6 Error Checking

The receiving device recalculates the CRC value during reception of the message and compares the calculated value to the actual value it received in the CRC field. An error will be reported if the two values are not equal. CRC calculation is first started by preloading the whole 16-bit register to 1's. The process begins by applying successive 8-bit bytes of the message to the current contents of the register. Only the eight bits of data in each character are used for generating the CRC. Start and stop bits, and the parity bit, do not apply to the CRC.

When generating the CRC, each 8-bit character is exclusive ORed with the register contents. The result is shifted towards the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined, if the LSB equals to 1, the register is exclusive ORed with a preset, fixed value; if the LSB equals to 0, no action will be taken. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next 8-bitbyte is exclusive ORed with the register's current value, and the process repeats for eight more shifts as described above. After all the bytes of the message have been applied, the final contents of the register, which should exchange the high-byte and the low-byte, is the CRC value. When the CRC is appended to the message, the low-order byte is appended first, followed by the high-order byte.

A procedure for generating a CRC is:

1. Load a 16-bit register with FFFF hex (all 1's). Call this the CRC register.
2. Exclusive OR the first 8-bit byte of the message with the low-order byte of the 16-bit CRC register, putting the result in the CRC register.
3. Shift the CRC register one bit to the right (toward the LSB), zero-filling the MSB. Extract and examine the LSB.
 - a. (If the LSB was 0): Repeat Step 3 (another shift).
 - b. (If the LSB was 1): Exclusive OR the CRC register with the polynomial value A001 hex (1010 0000 0000 0001).
4. Repeat Steps 3 and 4 until 8 shifts have been performed. When this is done, a complete 8-bit byte will have been processed.
5. Repeat Steps 2 through 5 for the next 8-bit byte of the message. Continue doing this until all bytes have been processed.
6. The final content in the CRC register is the CRC value.
7. When the CRC is placed into the message, its upper and lower bytes must be swapped as described below.

5.2 Communication Format

Explanation of frame

Table 5-3 Explanation of a Frame

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

As shown in table 4-3 the meaning of each abbreviated word is:

- Addr: Address of slave device
- Fun: Function code
- Data start reg HI: Start register address high byte
- Data start reg LO: Start register address low byte
- Data #of reg HI: Number of register high byte
- Data #of reg LO: Number of register low byte
- CRC16 HI: CRC high byte
- CRC16 LO: CRC low byte

1. Read Status of Relay (Function Code 01)

This function code is used to read the statues in Acuvim-L.1=On, 0=Off; There are 2 Relays in Acuvim-L. The Address of each Relay is Relay1=0000Hand Relay2=0001H. The following query is to read Relay Status of Acuvim-L.

Query

Table 5-4 Read the Status of Relay1 and Relay2 Query Message

| Addr | Fun | Relay start reg hi | Relay start reg lo | Relay # of reg hi | Relay # of reg lo | CRC16 Hi | CRC16 lo |
|------|-----|--------------------|--------------------|-------------------|-------------------|----------|----------|
| 11H | 01H | 00H | 00H | 00H | 02H | BFH | 5BH |

Response

The Acuvim-L response includes the Acuvim-L address, function code, quantity of data byte, the data, and error checking. An example response to read the status of Relay1 and Relay2 is shown as Table 5-5. The status of Relay 1 and Relay 2 are responding to the last 2 bits of the data.

Table 5-5 Relay Status Response

| Addr | Fun | Byte count | Data | CRC16 Hi | CRC16 Lo |
|------|-----|------------|------|----------|----------|
| 11H | 01H | 01H | 02H | BFH | 5BH |

The content of the data is:

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

MSB

LSB

(Relay 1 = OFF, Relay 2=ON)

2. Read the status of DI (Function 02)

Function Code 02, 1=On 0=Off.

DI1's address is 0x0000, DI2's address is 0x0001, and so on. The following query is to read the Status of 4 DIs of Acuvim-L with the address of 17.

Query:

Table 5-6 Read 4DIs Query Message

| Addr | Fun | DI start addr hi | DI start addr lo | DI num hi | DI num lo | CRC16 Hi | CRC16 Lo |
|------|-----|------------------|------------------|-----------|-----------|----------|----------|
| 11H | 02H | 00H | 00H | 00H | 04H | 7BH | 59H |

Response:

The Acuvim-L response includes the Acuvim-L address, function code, quantity of data characters, the data characters, and error checking. An example response to read the status of 4 DIs are shown as Table 5-7 The status of 4 DIs are responding to the last 4 bits of the data.

Table 5-7 Read Status of DI

| Addr | Fun | Byte count | Data | CRC16 Hi | CRC16 Lo |
|------|-----|------------|------|----------|----------|
| 11H | 01H | 01H | 03H | E5H | 49H |

The content of the data is:

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

MSB

LSB

DI1: bit0; DI2: bit1; DI3: bit2; DI4: bit3.

3. Read Data (Function Code 03)

This function allows the master to obtain the measurement results of Acuvim-L. There is an example to read the 3 measured data (F, U1 and U2) from slave device number 17, the data address of F is 0130H; U1 is 0131H, and V2 is 0132H.

Query:

Table 5-8 Read F, U1, U2 Query Message

| Addr | Fun | Data start addr hi | Data start addr lo | Data #of regs hi | Data #of regs lo | CRC16 hi | CRC16 lo |
|------|-----|--------------------|--------------------|------------------|------------------|----------|----------|
| 11H | 03H | 01H | 30H | 00H | 03H | 06H | A8H |

Response:

The Acuvim-L series meter response includes the address code, function code, quantity of data byte, data, and error checking. An example response to read F,V1 and V2 (F=1388H (50.00Hz), V1=03E7H (99.9V), V2=03E9H (100.1V) is shown as Table 5-9.

Table 5-9 Read F, V1 and V2 Message of Response

| Addr | Fun | Byte count | Data1 hi | Data1 lo | Data 2 hi | Data2 lo | Data3 hi | Data3 lo | CRC16 hi | CRC16 lo |
|------|-----|------------|----------|----------|-----------|----------|----------|----------|----------|----------|
| 11H | 03H | 06H | 13H | 88H | 03H | E7H | 03H | E9H | 7FH | 04H |

4. Write Relay Output

Function 05 allows the user to control the Relay. The example below is a request to an Acuvim-L series meter with closing the RO1.

Query:

Table 5-10 Write DO Query Message

| Addr | Fun | Data start reg hi | Data start reg lo | Data #of reg hi | Data #of reg lo | CRC16 hi | CRC16 lo |
|------|-----|-------------------|-------------------|-----------------|-----------------|----------|----------|
| 11H | 05H | 00H | 00H | FFH | 00H | 8EH | AAH |

Response:

Table 5-11 Write DO Message of Response

| Addr | Fun | Data start reg hi | Data start reg lo | Data #of reg hi | Data #of reg lo | CRC16 hi | CRC16 lo |
|------|-----|-------------------|-------------------|-----------------|-----------------|----------|----------|
| 11H | 05H | 00H | 00H | FFH | 00H | 8EH | AAH |

5. Preset / Reset Multi-Register (Function Code 16)

Function 16 allows the user to modify the contents of a multi-register. Any register that exists within the Acuvim-L series meter can have its contents changed by this message. The example below is a request to an Acuvim-L series meter with the address of 17 to Preset Ep_imp = (17807783.3KWH), while its HEX value is 0A9D4089H. Ep_imp data address is 0156H and 0157H.

Query:

Table 5-12 Preset KWH Query Message

| Addr | Fun | Data start reg HI | Data start reg LO | Data #of reg HI | Data #of reg LO | Byte Count |
|------|-----|-------------------|-------------------|-----------------|-----------------|------------|
| 11H | 10H | 01H | 56H | 00H | 02H | 04H |

| Value HI | Value LO | Value HI | Value LO | CRC 16 HI | CRC 16 LO |
|----------|----------|----------|----------|-----------|-----------|
| 0AH | 9DH | 40H | 89H | 4DH | B9H |

Response:

The normal response to a preset multi-register request includes the Acuvim-L series meter address, function code, data start register, the number of registers, and error checking.

Table 5-13 Preset KWH Query Message of Response

| Addr | Fun | Data start reg hi | Data start reg lo | Data #of reg hi | Data #of Reg lo | CRC16 hi | CRC16 lo |
|------|-----|-------------------|-------------------|-----------------|-----------------|----------|----------|
| 11H | 10H | 01H | 0CH | 00H | 02H | A2H | B4H |

5.3 Data Address Table

Basic Measurements

The data address of basis measurements includes primary data address and secondary data address. Function code: 03 read.

| Address | Parameter | Range | Data type | Type of access |
|---------|----------------------------|--------------|-----------|----------------|
| 2000H | Frequency F | 4500~6500 | Word | R |
| 2001H | A Phase voltage V1 | 0~65535 | Word | R |
| 2002H | B Phase voltage V2 | 0~65535 | Word | R |
| 2003H | C Phase voltage V3 | 0~65535 | Word | R |
| 2004H | Uinavg | 0~65535 | Word | R |
| 2005H | Line voltage V12 | 0~65535 | Word | R |
| 2006H | Line voltage V23 | 0~65535 | Word | R |
| 2007H | Line voltage V31 | 0~65535 | Word | R |
| 2008H | Ullavg | 0~65535 | Word | R |
| 2009H | current I1 | 0~65535 | Word | R |
| 200AH | current I2 | 0~65535 | Word | R |
| 200BH | current I3 | 0~65535 | Word | R |
| 200CH | Reserved | 0~65535 | Word | R |
| 200DH | Neutral line current in | 0~65535 | Word | R |
| 200EH | Itotal | 0~65535 | Word | R |
| 200FH | Iavg | 0~65535 | Word | R |
| 2010H | A Phase active power Pa | -32768~32767 | Word | R |
| 2011H | B Phase active power Pb | -32768~32767 | Word | R |
| 2012H | C Phase active power Pc | -32768~32767 | Word | R |
| 2013H | System active power Pcon | -32768~32767 | Word | R |
| 2014H | A Phase reactive power Qa | -32768~32767 | Word | R |
| 2015H | B Phase reactive power Qb | -32768~32767 | Word | R |
| 2016H | C Phase reactive power Qc | -32768~32767 | Word | R |
| 2017H | System reactive power Qcon | -32768~32767 | Word | R |
| 2018H | A Phase apparent power Sa | 0~65535 | Word | R |
| 2019H | B Phase apparent power Sb | 0~65535 | Word | R |
| 201AH | C Phase apparent power Sc | 0~65535 | Word | R |

| Address | Parameter | Range | Data type | Type of access |
|---------------|--|--------------|-----------|----------------|
| 201BH | System apparent power Scon | 0~65535 | Word | R |
| 201CH | A Phase power factor PFa | -1000~1000 | Word | R |
| 201DH | B Phase power factor PFb | -1000~1000 | Word | R |
| 201EH | C Phase power factor PFC | -1000~1000 | Word | R |
| 201FH | System power factor PFcon | -1000~1000 | Word | R |
| 2020H | Voltage unbalance factor U_unbl | 0~1000 | Word | R |
| 2021H | Current unbalance factor I_unbl | 0~1000 | Word | R |
| 2022H | Load nature RT (L/C/R) | 76/67/82 | Word | R |
| 2023H | Active power demand P_DEMA | -32768~32767 | Word | R |
| 2024H | Reactive power demand Q_DEMA | -32768~32767 | Word | R |
| 2025H | Apparent power demand S_DEMA | 0~65535 | Word | R |
| 2026H | A Phase current demand Ia_DEMA | 0~65535 | Word | R |
| 2027H | B Phase current demand Ib_DEMA | 0~65535 | Word | R |
| 2028H | C Phase current demand Ic_DEMA | 0~65535 | Word | R |
| 2029H | Neutral line Current demand IN_DEMA | 0~65535 | Word | R |
| 202AH | Active Power Forecasting Demand P_DEMA | -32768~32767 | Word | R |
| 202BH | Reactive Power Forecasting Demand Q_DEMA | -32768~32767 | Word | R |
| 202CH | Apparent Power Forecasting Demand S_DEMA | 0~65535 | Word | R |
| 202DH | A Phase current forecast demand Ia_DEMA | 0~65535 | Word | R |
| 202EH | B Phase current forecast demand Ib_DEMA | 0~65535 | Word | R |
| 202FH | C Phase current forecast demand Ic_DEMA | 0~65535 | Word | R |
| 2030H | Neutral line current forecast demand IN_DEMA | 0~65535 | Word | R |
| 2031H - 207FH | reserved | | Word | R |

The relationship between numerical value in register of the Acuvim-L series meter and the real physical value is shown in the following table. (Rx is numerical value in register of the Acuvim-L series meter.)

Table 5-15 Conversion Relationship of Basic Measurements

| Parameter | Relationship | Unit |
|-------------------------------------|---|---------|
| Voltage V1, V2, V3, V12, V23, V31 | $U = Rx \times (PT1 / PT2) / 10$ | Volt(V) |
| Current I1, I2, I3, In (Calculated) | $I = Rx \times (CT1/CT2) / 1000$ | Amp(A) |
| In (Measured) | $I = Rx \times (CTN1 / CTN2) / 1000$ | Amp(A) |
| Power Pa, Pb, Pc, Psum | $P = Rx \times (PT1 / PT2) \times (CT1/ CT2)$ | Watt(W) |
| Reactive power Qa, Qb, Qc, Qsum | $Q = Rx \times (PT1 / PT2) \times (CT1/ CT2)$ | var |
| Apparent power Sa, Sb, Sc, Ssum | $S = Rx \times (PT1 / PT2) \times (CT1/ CT2)$ | VA |
| Power factor PFa, PFb, PFC, PFsum | $PF = Rx / 1000$ | NA |
| Frequency | $F = Rx / 100$ | Hz |

| Parameter | Relationship | Unit |
|--|------------------------------|------|
| Load nature (R/L/C) | 67/76/82 | NA |
| Voltage or current unbalance factor U_unbl, I_unbl | $Unbl=(Rx/1000)\times 100\%$ | NA |

Note: If the value of CT2 is 333, as the CT2 as 1 for the numeration.

Table 5-16 Primary Data Address of Basic Measurements

| Address | Parameter | Data type | Type of access |
|-------------|----------------------------|-----------|----------------|
| 2180H-2181H | Frequency F | Float | R |
| 2182H-2183H | A Phase voltage V1 | Float | R |
| 2184H-2185H | B Phase voltage V2 | Float | R |
| 2186H-2187H | C Phase voltage V3 | Float | R |
| 2188H-2189H | Uinavg | Float | R |
| 218AH-218BH | Line voltage V12 | Float | R |
| 218CH-218DH | Line voltage V23 | Float | R |
| 218EH-218FH | Line voltage V31 | Float | R |
| 2190H-2191H | Ullavg | Float | R |
| 2192H-2193H | current I1 | Float | R |
| 2194H-2195H | current I2 | Float | R |
| 2196H-2197H | current I3 | Float | R |
| 2198H-2199H | Reversed | Float | R |
| 219AH-219BH | Neutral line current | Float | R |
| 219CH-219DH | Itotal | Float | R |
| 219EH-219FH | Iavg | Float | R |
| 21A0H-21A1H | A Phase active power Pa | Float | R |
| 21A2H-21A3H | B Phase active power Pb | Float | R |
| 21A4H-21A5H | C Phase active power Pc | Float | R |
| 21A6H-21A7H | System active power Pcon | Float | R |
| 21A8H-21A9H | A Phase reactive power Qa | Float | R |
| 21AAH-21ABH | B Phase reactive power Qb | Float | R |
| 21ACH-21ADH | C Phase reactive power Qc | Float | R |
| 21AEH-21AFH | System reactive power Qcon | Float | R |
| 21B0H-21B1H | A Phase apparent power Sa | Float | R |
| 21B2H-21B3H | B Phase apparent power Sb | Float | R |
| 21B4H-21B5H | C Phase apparent power Sc | Float | R |
| 21B6H-21B7H | System apparent power Scon | Float | R |
| 21B8H-21B9H | A Phase power factor PFa | Float | R |
| 21BAH-21BBH | B Phase power factor PFb | Float | R |

| Address | Parameter | Data type | Type of access |
|-------------|--|-----------|----------------|
| 21BCH-21BDH | C Phase power factor PFc | Float | R |
| 21BEH-21BFH | System power factor PFcon | Float | R |
| 21C0H-21C1H | Voltage unbalance factor U_unbl | Float | R |
| 21C2H-21C3H | Current unbalance factor I_unbl | Float | R |
| 21C4H-21C5H | Load nature RT (L/C/R) | Float | R |
| 21C6H-21C7H | Active power demand P_DEMA | Float | R |
| 21C8H-21C9H | Reactive power demand Q_DEMA | Float | R |
| 21CAH-21CBH | Apparent power demand S_DEMA | Float | R |
| 21CCH-21CDH | A Phase current demand Ia_DEMA | Float | R |
| 21CEH-21CFH | B Phase current demand Ib_DEMA | Float | R |
| 21D0H-21D1H | C Phase current demand Ic_DEMA | Float | R |
| 21D2H-21D3H | Neutral line current demand IN_DEMA | Float | R |
| 21D4H-21D5H | Active Power Forecasting Demand P_DEMA | Float | R |
| 21D6H-21D7H | Reactive Power Forecasting Demand Q_DEMA | Float | R |
| 21D8H-21D9H | Apparent Power Forecasting Demand S_DEMA | Float | R |
| 21DAH-21DBH | A Phase current forecast demand Ia_DEMA | Float | R |
| 21DCH-21DDH | B Phase current forecast demand Ib_DEMA | Float | R |
| 21DEH-21DFH | C Phase current forecast demand Ic_DEMA | Float | R |
| 21E0H-21E1H | Neutral line current forecast demand IN_DEMA | Float | R |

Power Quality Parameters Area

The parameters in the region are related to power quality data, using the Modbus protocol function 03 code reader. Energy parameter address table, see Table 5-17.

Table 5-17 Data Table of Power Quality Measurements

| Address | Parameter | Data Range | Data type | Type of access |
|---------|-----------------------------|------------|-----------|----------------|
| 23C0H | THD_V1 of V1(or V12) | 0~32768 | word | R |
| 23C1H | THD_V2 of V2(or V31) | 0~32768 | word | R |
| 23C2H | THD_V3 of V3(or V23) | 0~32768 | word | R |
| 23C3H | THD_V (THD Voltage Average) | 0~32768 | word | R |
| 23C4H | THD I1 of I1 | 0~32768 | word | R |
| 23C5H | THD I1 of I2 | 0~32768 | word | R |
| 23C6H | THD I1 of I3 | 0~32768 | word | R |
| 23C7H | THD I1 of IN | 0~32768 | word | R |
| 23C8H | THD_I (THD Current Average) | 0~32768 | word | R |
| 23C9H | Odd THD of V1 (or V12) | 0~32768 | word | R |
| 23CAH | Even THD of V1 (or V12) | 0~32768 | word | R |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|------------------------------------|------------|-----------|----------------|
| 23CBH | THFF of V1 (or V12) | 0~65535 | word | R |
| 23CCH | Crest Factor of V1(or V12) | 0~32768 | word | R |
| 23CDH | Odd THD of V2 (or V23) | 0~32768 | word | R |
| 23CEH | Even THD of V2 (or V23) | 0~32768 | word | R |
| 23CFH | THFF of V2 (or V23) | 0~65535 | word | R |
| 23D0H | Crest Factor of V2 (or V23) | 0~32768 | word | R |
| 23D1H | Odd THD of V3 (or V31) | 0~32768 | word | R |
| 23D2H | Even THD of V3 (or V31) | 0~32768 | word | R |
| 23D3H | THFF of V3 (or V31) | 0~65535 | word | R |
| 23D4H | Crest Factor of V1 (or V12) | 0~32768 | word | R |
| 23D5H | Odd THD of I1 | 0~32768 | word | R |
| 23D6H | Even THD of I1 | 0~32768 | word | R |
| 23D7H | K Factor of I1 | 0~65535 | word | R |
| 23D8H | Odd THD of I2 | 0~32768 | word | R |
| 23D9H | Even THD of I2 | 0~32768 | word | R |
| 23DAH | K Factor of I2 | 0~65535 | word | R |
| 23DBH | Odd THD of I3 | 0~32768 | word | R |
| 23DCH | Even THD of I3 | 0~32768 | word | R |
| 23DDH | K Factor of I3 | 0~65535 | word | R |
| 23DEH | Odd THD of IN | 0~32768 | word | R |
| 23DFH | Even THD of IN | 0~32768 | word | R |
| 23E0H | K Factor of IN | 0~65535 | word | R |
| 23E1H-241EH | Harmonic Spectrum of V1 (2nd~63st) | 0~32768 | word | R |
| 241FH-245CH | Harmonic Spectrum of V2 (2nd~63st) | 0~32768 | word | R |
| 245D-249AH | Harmonic Spectrum of V3 (2nd~63st) | 0~32768 | word | R |
| 249BH-24D8H | Harmonic Spectrum of I1 (2nd~63st) | 0~32768 | word | R |
| 24D9H-2516H | Harmonic Spectrum of I2 (2nd~63st) | 0~32768 | word | R |
| 2517H-2554H | Harmonic Spectrum of I3 (2nd~63st) | 0~32768 | word | R |
| 2555H-2592H | Harmonic Spectrum of IN (2nd~63st) | 0~32768 | word | R |

The relationship between numerical value in register of Acuvim-L and the real physical value is as following table. (Rx is numerical value in register of Acuvim-L.)

Table 5-18 Conversion Relationship of Power Quality Measurements

| Parameter | Relationship | Unit |
|------------------|-----------------------------------|------|
| THD | $THD = Rx / 10000 \times 100\%$ | NA |
| Harmonic content | $THD_n = Rx / 10000 \times 100\%$ | NA |

Statistics Measurements

Function code: 03 read

Table 5-19 Data Address of Statistics Measurements

| Address | Parameter | Data Range | Data type | Type of access |
|---------------|---|--------------|-----------|----------------|
| Max, 03H read | | | | |
| 3000H | Time Stamp - Year (Max of V1) | 00~99 | word | R |
| | Time Stamp - Month (Max of V1) | 1~12 | | R |
| 3001H | Time Stamp - Day (Max of V1) | 1~31 | word | R |
| | Time Stamp - Hours (Max of V1) | 0~23 | | R |
| 3002H | Time Stamp - Minute (Max of V1) | 0~59 | word | R |
| | Time Stamp - Second (Max of V1) | 0~59 | | R |
| 3003H | Max of V1 | -32768~32767 | word | R |
| 3004H-3007H | Time Stamp and Max of V2 | -32768~32767 | word | R |
| 3008H-300BH | Time Stamp and Max of V3 | -32768~32767 | word | R |
| 300CH-300FH | Time Stamp and Max of V12 | -32768~32767 | word | R |
| 3010H-3013H | Time Stamp and Max of V23 | -32768~32767 | word | R |
| 3014H-3017H | Time Stamp and Max of V31 | -32768~32767 | word | R |
| 3018H-301BH | Time Stamp and Max of I1 | -32768~32767 | word | R |
| 301CH-301FH | Time Stamp and Max of I2 | -32768~32767 | word | R |
| 3020H-3023H | Time Stamp and Max of I3 | -32768~32767 | word | R |
| 3024H-3027H | Time Stamp and Max of IN | -32768~32767 | word | R |
| 3028H-302BH | Time Stamp and Max of System Power | -32768~32767 | word | R |
| 302CH-302FH | Time Stamp and Max of System Reactive Power | -32768~32767 | word | R |
| 3030H-3033H | Time Stamp and Max of System Apparent Power | -32768~32767 | word | R |
| 3034H-3037H | Time Stamp and Max of System Power Factor | -32768~32767 | word | R |
| 3038H-303BH | Time Stamp and Max of System Frequency | -32768~32767 | word | R |
| 303CH-303FH | Time Stamp and Max of Unbalance Voltage | -32768~32767 | word | R |
| 3040H-3043H | Time Stamp and Max of Unbalance Current | -32768~32767 | word | R |
| 3044H-3047H | Time Stamp and Max of THD V1 | -32768~32767 | word | R |
| 3048H-304BH | Time Stamp and Max of THD V2 | -32768~32767 | word | R |
| 304CH-304FH | Time Stamp and Max of THD V3 | -32768~32767 | word | R |
| 3050H-3053H | Time Stamp and Max of THD I1 | -32768~32767 | word | R |
| 3054H-3057H | Time Stamp and Max of THD I2 | -32768~32767 | word | R |
| 3058H-305BH | Time Stamp and Max of THD I3 | -32768~32767 | word | R |
| 305CH-305FH | Time Stamp and Max of THD IN | -32768~32767 | word | R |
| 3060H-3063H | Time Stamp and Max of Power demand | -32768~32767 | word | R |

| | | | | |
|---------------|---|--------------|------|---|
| 3064H-3067H | Time Stamp and Max of Reactive Power demand | -32768~32767 | word | R |
| 3068H-306BH | Time Stamp and Max of Apparent Power demand | -32768~32767 | word | R |
| 306CH-306FH | Time Stamp and Max of I1 Demand | -32768~32767 | word | R |
| 3070H-3073H | Time Stamp and Max of I2 Demand | -32768~32767 | word | R |
| 3074H-3077H | Time Stamp and Max of I3 Demand | -32768~32767 | word | R |
| 3078H-307B | Time Stamp and Max of IN Demand | -32768~32767 | word | R |
| Min, 03H read | | | | |
| 307CH-307FH | Time Stamp and Min of V1 | -32768~32767 | word | R |
| 3080H-3083H | Time Stamp and Min of V2 | -32768~32767 | word | R |
| 3084H-3087H | Time Stamp and Min of V3 | -32768~32767 | word | R |
| 3088H-308BH | Time Stamp and Min of V12 | -32768~32767 | word | R |
| 308CH-308FH | Time Stamp and Min of V23 | -32768~32767 | word | R |
| 3090H-3093H | Time Stamp and Min of V31 | -32768~32767 | word | R |
| 3094H-3097H | Time Stamp and Min of I1 | -32768~32767 | word | R |
| 3098H-309BH | Time Stamp and Min of I2 | -32768~32767 | word | R |
| 309CH-309FH | Time Stamp and Min of I3 | -32768~32767 | word | R |
| 30A0H-30A3H | Time Stamp and Min of IN | -32768~32767 | word | R |
| 30A4H-30A7H | Time Stamp and Min of System Power | -32768~32767 | word | R |
| 30A8H-30ABH | Time Stamp and Min of System Reactive Power | -32768~32767 | word | R |
| 30ACH-30AFH | Time Stamp and Min of System Apparent Power | -32768~32767 | word | R |
| 30B0H-30B3H | Time Stamp and Min of System Power Factor | -32768~32767 | word | R |
| 30B4H-30B7H | Time Stamp and Min of System Frequency | -32768~32767 | word | R |
| 30B8H-30BBH | Time Stamp and Min of Unbalance Voltage | -32768~32767 | word | R |
| 30BCH-30BFH | Time Stamp and Min of Unbalance Current | -32768~32767 | word | R |
| 30C0H-30C3H | Time Stamp and Min of THD V1 | -32768~32767 | word | R |
| 30C4H-30C7H | Time Stamp and Min of THD V2 | -32768~32767 | word | R |
| 30C8H-30CB | Time Stamp and Min of THD V3 | -32768~32767 | word | R |
| 30CCH-30CFH | Time Stamp and Min of THD I1 | -32768~32767 | word | R |
| 30D0-30D3H | Time Stamp and Min of THD I2 | -32768~32767 | word | R |
| 30D4H-30D7H | Time Stamp and Min of THD I3 | -32768~32767 | word | R |
| 30D8H-30DBH | Time Stamp and Min of THD IN | -32768~32767 | word | R |

This address space is stored meter run time and load run-time parameters, as shown in the table.

Table 5-20 Run Time Parameter Address

| Clock parameters, 03H read | | | | |
|----------------------------|------------------------------|-------------|-------|---|
| 180H | Meter run time (high 16 bit) | 0~999999999 | Dword | R |
| 181H | Meter run time (low 16 bit) | | | |
| 182H | Load run time (high 16 bit) | 0~999999999 | Dword | R |
| 183H | Load run time (low 16 bit) | | | |

The table below is the conversion relationship for run time.

Table 5-21 Conversion Relationship of Run Time

| Parameter | Relationship | Unit |
|----------------|----------------------|------|
| Meter run time | Run_Hur = Rx/100 | H |
| Load run time | Run_LoadHur = Rx/100 | H |

Parameter Setting

Function code: 03 read; 16 preset

Table 5-22 Data Address of Setting Parameter

| Address | Parameter | Data Range | Data type | Type of access |
|---------------------|---------------------------|---|-----------|----------------|
| 03H read; 10H write | | | | |
| 1000H | Access code | 0~9999 | R/W | word |
| 1001H | Communication Address | 1~247 | R/W | word |
| 1002H | Baud Rate | 1200~38400, 57600 | R/W | word |
| 1003H | Parity Mode | 0: EVEN; 1: ODD; 2: NONE2; 3: NONE1. | R/W | Word |
| 1004H | Voltage Input Wiring Type | 0: 3Ln; 1: 3LL; 2: 2LL; 3: 1Ln; 4: 1LL; | R/W | word |
| 1005H | Current Input Wiring Type | 0: 3CT; 1: 2CT; 2: 1CT | R/W | word |
| 1006H | PT1 (High 16 bit) | 500~10000000 | R/W | Word |
| 1007H | PT1 (Low 16 bit) | | R/W | Word |
| 1008H | PT2 | 500~4000 | R/W | Word |
| 1009H | CT1 | 1~50000 | R/W | Word |
| 100AH | CT2 | 1A, 5A, 333mV, 100mV, (80, 100, 200) mA, 6.68mA 1) It can be modified when the CT mode is 5/1A 2) It can be switched among 80,100 and 200 when the CT mode is 200mA 3) It is not allowed to modify when the CT mode is other types | R/W | Word |
| 100BH | CTN1 | 1~50000 | R/W | Word |

| Address | Parameter | Data Range | Data type | Type of access |
|---------|-----------------------------------|---|-----------|----------------|
| 100CH | CTN2 | 1A, 5A, 333mV, 100mV, (80, 100, 200) mA, 6.68mA It can be modified when the CT mode is 5/1A It can be switched among 80,100 and 200 when the CT mode is 200mA It is not allowed to modify when the CT mode is other types | R/W | Word |
| 100DH | Definition of Middle line current | 0: Calculated; 1: Measured | R/W | Word |
| 100EH | Definition of reactive power | 0- sinusoidal; 1: non-sinusoidal | R/W | Word |
| 100FH | Nonstandard Options of The Lead | Bit0: The Parameters of The First Way Communication Bit1: The Parameters of the second Way Communication Bit2: The Parameters of Clear Run Time Contents Bit3: DI counter number; Bit4: The Contents of TOU; 1: bit-appropriate available 0: bit-appropriate invalid | R/W | Word |
| 1010H | Current I1 direction | 0: Positive; 1: Negative | R/W | Word |
| 1011H | Current I2 direction | 0: Positive; 1: Negative | R/W | Word |
| 1012H | Current I3 direction | 0: Positive; 1: Negative | R/W | Word |
| 1013H | Energy Calculating Mode | 0: Primary; 1: Secondary | R/W | Word |
| 1014H | Demand Calculating Mode | 0: Sliding Window Demand 1: Fixed Window Demand 2: Rolling Window Demand 3: Thermal Demand | R/W | Word |
| 1015H | Averaging Interval Window | 1~30min | R/W | Word |
| 1016H | Sub-Interval | 1~30min | R/W | Word |
| 1017H | VAR/PF Convention | 0: IEC; 1: IEEE | R/W | Word |
| 1018H | Demand Clear | Only 0AH Work | R/W | Word |
| 1019H | Energy Calculating Mode | 0: Disable; 1: Enable | R/W | Word |
| 101AH | Energy Clear | Only 0AH Work | R/W | Word |
| 101BH | Reset Total Run Time | Only 0AH Work | R/W | Word |
| 101CH | Reset Load Time Clear | Only 0AH Work | R/W | Word |
| 101DH | Reset Run Time | Only 0AH Work | R/W | Word |
| 101EH | Enable Holiday Years Setting | 0: Disable; 1: Enable | R/W | Word |
| 101FH | Sharp Demand Clear | Only 0AH Work | R/W | Word |
| 1020H | Peak Demand Clear | Only 0AH Work | R/W | Word |
| 1021H | Valley Demand Clear | Only 0AH Work | R/W | Word |
| 1022H | Normal Demand Clear | Only 0AH Work | R/W | Word |

| Address | Parameter | Data Range | Data type | Type of access |
|---------|------------------------------------|--|-----------|----------------|
| 1023H | Total Demand Clear | Only 0AH Work | R/W | Word |
| 1024H | Reset Max and Min | Only 0AH Work | R/W | Word |
| 1025H | Turn On the Backlight | 0~120(min) | R/W | Word |
| 1026H | Reverse | 0: Modbus-RTU; 1: Profibus | R/W | Word |
| 1027H | Communication Address of Channel 2 | 1-247(MODBUS); 0~126: Profibus; | R/W | Word |
| 1028H | Baud Rate of Channel 2 | 1200-38400(DL/EL), 57600 | R/W | Word |
| 1029H | Parity Mode of Channel 2 | 0: EVEN ;1: ODD; 2: NONE2; 3: NONE1. | R/W | Word |
| 102AH | Enable Wiring Check | Only 0AH Work | R/W | Word |
| 102BH | Expected Power Factor | Capacitive: 67; Inductive: 76; Resistive: 82; | R/W | Word |
| 102CH | Expected Load Type | -1000~1000 | R/W | Integer |
| 102DH | Reverse | | R/W | Word |

Parameter of Clock

Function code:03 read,16: preset

Table 5-23 Data Address of Clock Parameter

| Address | Parameter | Data Range | Data type | Type of access |
|---------------------|-----------------------|-------------|-----------|----------------|
| 03H read, 10H write | | | | |
| 2280H | Year | 2000-2099 | R/W | Word |
| 2281H | Month | 1-12 | R/W | Word |
| 2282H | Day | 1-31 | R/W | Word |
| 2283H | Hour | 0-23 | R/W | Word |
| 2284H | Minute | 0-59 | R/W | Word |
| 2285H | Second | 0-59 | R/W | Word |
| 2286H | Week | 0-6 | R/W | Word |
| 2287H | Total Run Time (High) | 0~999999999 | R | Dword |
| 2288H | Total Run Time (Low) | | | |
| 2289H | Load Run Time (High) | 0~999999999 | R | Dword |
| 228AH | Load Run Time (Low) | | | |
| 228BH | Run Time (High) | 0~999999999 | R | Dword |
| 228CH | Run Time (Low) | | | |
| 228DH-22BFH | Reverse | | R | Word |

Energy Measurements

The data address of energy measurements includes real time energy and TOU energy, the relationship between the real time energy and TOU energy is as follows:

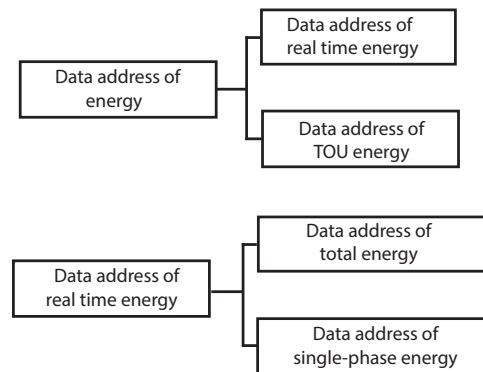


Fig 5-1 Division Plans of Energy Address

Data address of real time energy and single-phase energy, function: 03 read; 16 preset.

Table 5-24 Data Address of Real Time Energy

| Address | Parameter | Data Range | Data type | Type of access |
|--------------------------------------|---------------------------------------|----------------------|-----------|----------------|
| Real-time energy, 3H read, 10H write | | | | |
| 2080H-2081H | Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 2082H-2083H | Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 2084H-2085H | Energy Total Ep_total | 0~999999999 | R/W | Dword |
| 2086H-2087H | Energy Net Ep_net | -999999999~999999999 | R/W | Dword |
| 2088H-2089H | First Quartile Energy Ep_q1 | 0~999999999 | R/W | Dword |
| 208AH-208BH | Second Quartile Energy Ep_q2 | 0~999999999 | R/W | Dword |
| 208C-208DH | Third Quartile Energy Ep_q3 | 0~999999999 | R/W | Dword |
| 208EH-208FH | Fourth Quartile Energy Ep_q4 | 0~999999999 | R/W | Dword |
| 2090H-2091H | Inductive Reactive Energy Eq_imp | 0~999999999 | R/W | Dword |
| 2092H-2093H | Capacitive Reactive Energy Eq_exp | 0~999999999 | R/W | Dword |
| 2094H-2095H | Reactive Energy Total Eq_total | 0~999999999 | R/W | Dword |
| 2096H-2097H | Reactive Energy Net Eq_net | -999999999~999999999 | R/W | Dword |
| 2098H-2099H | First Quartile Reactive Energy Eq_q1 | 0~999999999 | R/W | Dword |
| 209AH-209BH | Second Quartile Reactive Energy Eq_q2 | 0~999999999 | R/W | Dword |
| 209CH-209DH | Third Quartile Reactive Energy Eq_q3 | 0~999999999 | R/W | Dword |
| 209EH-209FH | Fourth Quartile Reactive Energy Eq_q4 | 0~999999999 | R/W | Dword |

| | | | | |
|---|---------------------------------------|----------------------|-----|-------|
| 20A0H-20A1H | Apparent Energy IMP Es_imp | 0~999999999 | R/W | Dword |
| 20A2H-20A3H | Apparent Energy EXP ES_exp | 0~999999999 | R/W | Dword |
| 20A4H-20A5H | Apparent Energy Total Es_total | 0~999999999 | R/W | Dword |
| 20A6H-20A7H | Apparent Energy Net Es_net | -999999999~999999999 | R/W | Dword |
| 20A8H-20A9H | First Quartile Apparent Energy Es_q1 | 0~999999999 | R/W | Dword |
| 20AAH-20ABH | Second Quartile Apparent Energy Es_q2 | 0~999999999 | R/W | Dword |
| 20ACH-20ADH | Third Quartile Apparent Energy Es_q3 | 0~999999999 | R/W | Dword |
| 20AEH-20AFH | Fourth Quartile Apparent Energy Es_q4 | 0~999999999 | R/W | Dword |
| Real-time single-phase energy, 3H read, 10H write | | | | |
| 20B0H-20B1H | Phase A Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20B2H-20B3H | Phase A Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20B4H-20B5H | Phase B Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20B6H-20B7H | Phase B Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20B8H-20B9H | Phase C Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20BAH-20BBH | Phase C Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20BCH-20BDH | Phase A Reactive Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20BEH-20BFH | Phase A Reactive Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20C0H-20C1H | Phase B Reactive Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20C2H-20C3H | Phase B Reactive Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20C4H-20C5H | Phase C Reactive Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20C6H-20C7H | Phase C Reactive Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20C8H-20C9H | Phase A Apparent Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20CAH-20CBH | Phase A Apparent Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20CCH-20CDH | Phase B Apparent Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20CEH-20CFH | Phase B Apparent Energy EXP Ep_exp | 0~999999999 | R/W | Dword |
| 20D0H-20D1H | Phase C Apparent Energy IMP Ep_imp | 0~999999999 | R/W | Dword |
| 20D2H-20D3H | Phase C Apparent Energy EXP Ep_exp | 0~999999999 | R/W | Dword |

Table 5-25 Conversion of Energy Parameter

| Parameter | Relationship | Unit |
|---|------------------|-------|
| Power energy Ep_imp, Ep_exp (Primary) | $E_p = R_x/10$ | kWh |
| Power energy Ep_imp, Ep_exp (Secondary side) | $E_p = R_x/1000$ | kWh |
| Reactive energy Eq_imp, Eq_exp (Primary) | $E_q = R_x/10$ | KVARh |
| Reactive energy Eq_imp, Eq_exp (Secondary side) | $E_q = R_x/1000$ | KVARh |
| Apparent energy Es (Primary) | $E_s = R_x/10$ | KVAh |
| Apparent energy Es (Secondary side) | $E_s = R_x/1000$ | KVAh |

Data Address of TOU Energy

The data address saves the parameter of energy, which includes the Data address of last month's TOU energy, the Data address of current month's TOU energy, the Data address of TOU parameter settings, and Data address of TOU default parameters. Except for the data address of TOU default parameters, the data address can be read with 03 code, preset with 16 code.

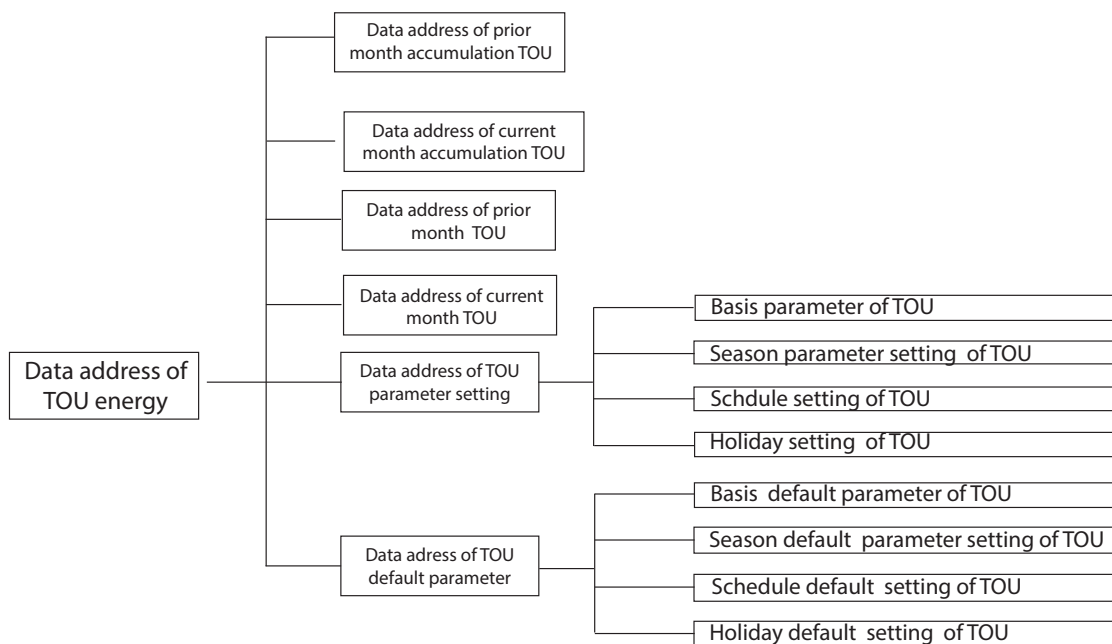


Fig 5-2 Division Plan of TOU Energy

Table 5-26 Data Address of Prior and Current Month

| Address | Parameter | Data Range | Datatype | Type of access |
|---|-------------------------------|-------------|----------|----------------|
| Current month (Accumulated) (High Byte in Most, Low Byte in last) | | | | |
| 3500H-3501H | Import Energy Ep_imp (Sharp) | 0~999999999 | Dword | R/W |
| 3502H-3503H | Import Energy Ep_imp (Peak) | 0~999999999 | Dword | R/W |
| 3504H-3505H | Import Energy Ep_imp (Valley) | 0~999999999 | Dword | R/W |
| 3506H-3507H | Import Energy Ep_imp (Normal) | 0~999999999 | Dword | R/W |
| 3508H-3509H | Import Energy Ep_imp (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------------------|----------------------|----------|----------------|
| 350AH-350BH | Export Energy Ep_exp (Sharp) | 0~999999999 | Dword | R/W |
| 350CH-350DH | Export Energy Ep_exp (Peak) | 0~999999999 | Dword | R/W |
| 350EH-350FH | Export Energy Ep_exp (Valley) | 0~999999999 | Dword | R/W |
| 3510H-3511H | Export Energy Ep_exp (Normal) | 0~999999999 | Dword | R/W |
| 3512H-3513H | Export Energy Ep_exp (Total) | 0~999999999 | Dword | R/W |
| 3514H-3515H | Ep_total (Sharp) | 0~999999999 | Dword | R/W |
| 3516H-3517H | Ep_total (Peak) | 0~999999999 | Dword | R/W |
| 3518H-3519H | Ep_total (Valley) | 0~999999999 | Dword | R/W |
| 351AH-351BH | Ep_total (Normal) | 0~999999999 | Dword | R/W |
| 351CH-351DH | Ep_total (Total) | 0~999999999 | Dword | R/W |
| 351EH-351FH | Ep_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3520H-3521H | Ep_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3522H-3523H | Ep_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3524H-3525H | Ep_net (Normal) | -999999999~999999999 | Dword | R/W |
| 3526H-3527H | Ep_net (Total) | -999999999~999999999 | Dword | R/W |
| 3528H-3529H | Ep_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 352AH-352BH | Ep_q1 (Peak) | 0~999999999 | Dword | R/W |
| 352CH-352DH | Ep_q1 (Valley) | 0~999999999 | Dword | R/W |
| 352EH-352FH | Ep_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3530H-3531H | Ep_q1 (Total) | 0~999999999 | Dword | R/W |
| 3532H-3533H | Ep_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3534H-3535H | Ep_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3536H-3537H | Ep_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3538H-3539H | Ep_q2 (Normal) | 0~999999999 | Dword | R/W |
| 353AH-353BH | Ep_q2 (Total) | 0~999999999 | Dword | R/W |
| 353CH-353DH | Ep_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 353EH-353FH | Ep_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3540H-3541H | Ep_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3542H-3543H | Ep_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3544H-3545H | Ep_q3 (Total) | 0~999999999 | Dword | R/W |
| 3546H-3547H | Ep_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3548H-3549H | Ep_q4 (Peak) | 0~999999999 | Dword | R/W |
| 354AH-354BH | Ep_q4 (Valley) | 0~999999999 | Dword | R/W |
| 354CH-354DH | Ep_q4 (Normal) | 0~999999999 | Dword | R/W |
| 354EH-354FH | Ep_q4 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------------------------|----------------------|----------|----------------|
| 3550H-3551H | Inductive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 3552H-3553H | Inductive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 3554H-3555H | Inductive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3556H-3557H | Inductive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3558H-3559H | Inductive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 355AH-355BH | Capacitive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 355CH-355DH | Capacitive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 355EH-355FH | Capacitive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3560H-3561H | Capacitive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3562H-3563H | Capacitive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 3564H-3565H | Eq_total (Sharp) | 0~999999999 | Dword | R/W |
| 3566H-3567H | Eq_total (Peak) | 0~999999999 | Dword | R/W |
| 3568H-3569H | Eq_total (Valley) | 0~999999999 | Dword | R/W |
| 356AH-356BH | Eq_total (Normal) | 0~999999999 | Dword | R/W |
| 356CH-356DH | Eq_total (Total) | 0~999999999 | Dword | R/W |
| 356EH-356FH | Eq_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3570H-3571H | Eq_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3572H-3573H | Eq_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3574H-3575H | Eq_net (Normal) | -999999999~999999999 | Dword | R/W |
| 3576H-3577H | Eq_net (Total) | -999999999~999999999 | Dword | R/W |
| 3578H-3579H | Eq_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 357AH-357BH | Eq_q1 (Peak) | 0~999999999 | Dword | R/W |
| 357CH-357DH | Eq_q1 (Valley) | 0~999999999 | Dword | R/W |
| 357EH-357FH | Eq_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3580H-3581H | Eq_q1 (Total) | 0~999999999 | Dword | R/W |
| 3582H-3583H | Eq_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3584H-3585H | Eq_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3586H-3587H | Eq_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3588H-3589H | Eq_q2 (Normal) | 0~999999999 | Dword | R/W |
| 358AH-358BH | Eq_q2 (Total) | 0~999999999 | Dword | R/W |
| 358CH-358DH | Eq_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 358EH-358FH | Eq_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3590H-3591H | Eq_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3592H-3593H | Eq_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3594H-3595H | Eq_q3 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------|----------------------|----------|----------------|
| 3596H-3597H | Eq_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3598H-3599H | Eq_q4 (Peak) | 0~999999999 | Dword | R/W |
| 359AH-359BH | Eq_q4 (Valley) | 0~999999999 | Dword | R/W |
| 359CH-359DH | Eq_q4 (Normal) | 0~999999999 | Dword | R/W |
| 359EH-359FH | Eq_q4 (Total) | 0~999999999 | Dword | R/W |
| 35A0H-35A1H | Es_imp (Sharp) | 0~999999999 | Dword | R/W |
| 35A2H-35A3H | Es_imp (Peak) | 0~999999999 | Dword | R/W |
| 35A4H-35A5H | Es_imp (Valley) | 0~999999999 | Dword | R/W |
| 35A6H-35A7H | Es_imp (Normal) | 0~999999999 | Dword | R/W |
| 35A8H-35A9H | Es_imp (Total) | 0~999999999 | Dword | R/W |
| 35AAH-35ABH | Es_exp (Sharp) | 0~999999999 | Dword | R/W |
| 35ACH-35ADH | Es_exp (Peak) | 0~999999999 | Dword | R/W |
| 35AEH-35AFH | Es_exp (Valley) | 0~999999999 | Dword | R/W |
| 35B0H-35B1H | Es_exp (Normal) | 0~999999999 | Dword | R/W |
| 35B2H-35B3H | Es_exp (Total) | 0~999999999 | Dword | R/W |
| 35B4H-35B5H | Es_total (Sharp) | 0~999999999 | Dword | R/W |
| 35B6H-35B7H | Es_total (Peak) | 0~999999999 | Dword | R/W |
| 35B8H-35B9H | Es_total (Valley) | 0~999999999 | Dword | R/W |
| 35BAH-35BBH | Es_total (Normal) | 0~999999999 | Dword | R/W |
| 35BCH-35BDH | Es_total (Total) | 0~999999999 | Dword | R/W |
| 35BEH-35BFH | Es_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 35C0H-35C1H | Es_net (Peak) | -999999999~999999999 | Dword | R/W |
| 35C2H-35C3H | Es_net (Valley) | -999999999~999999999 | Dword | R/W |
| 35C4H-35C5H | Es_net (Normal) | -999999999~999999999 | Dword | R/W |
| 35C6H-35C7H | Es_net (Total) | -999999999~999999999 | Dword | R/W |
| 35C8H-35C9H | Es_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 35CAH-35CBH | Es_q1 (Peak) | 0~999999999 | Dword | R/W |
| 35CCH-35CDH | Es_q1 (Valley) | 0~999999999 | Dword | R/W |
| 35CEH-35CFH | Es_q1 (Normal) | 0~999999999 | Dword | R/W |
| 35D0H-35D1H | Es_q1 (Total) | 0~999999999 | Dword | R/W |
| 35D2H-35D3H | Es_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 35D4H-35D5H | Es_q2 (Peak) | 0~999999999 | Dword | R/W |
| 35D6H-35D7H | Es_q2 (Valley) | 0~999999999 | Dword | R/W |
| 35D8H-35D9H | Es_q2 (Normal) | 0~999999999 | Dword | R/W |
| 35DAH-35DBH | Es_q2 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|---|-------------------------------|----------------------|----------|----------------|
| 35DCH-35DDH | Es_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 35DEH-35DFH | Es_q3 (Peak) | 0~999999999 | Dword | R/W |
| 35E0H-35E1H | Es_q3 (Valley) | 0~999999999 | Dword | R/W |
| 35E2H-35E3H | Es_q3 (Normal) | 0~999999999 | Dword | R/W |
| 35E4H-35E5H | Es_q3 (Total) | 0~999999999 | Dword | R/W |
| 35E6H-35E7H | Es_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 35E8H-35E9H | Es_q4 (Peak) | 0~999999999 | Dword | R/W |
| 35EAH-35EBH | Es_q4 (Valley) | 0~999999999 | Dword | R/W |
| 35ECH-35EDH | Es_q4 (Normal) | 0~999999999 | Dword | R/W |
| 35EEH-35EFH | Es_q4 (Total) | 0~999999999 | Dword | R/W |
| Prior Month (Accumulated) (High Byte in Most, Low Byte in last) | | | | |
| 35F0H-35F1H | Import Energy Ep_imp (Sharp) | 0~999999999 | Dword | R/W |
| 35F2H-35F3H | Import Energy Ep_imp (Peak) | 0~999999999 | Dword | R/W |
| 35F4H-35F5H | Import Energy Ep_imp (Valley) | 0~999999999 | Dword | R/W |
| 35F6H-35F7H | Import Energy Ep_imp (Normal) | 0~999999999 | Dword | R/W |
| 35F8H-35F9H | Import Energy Ep_imp (Total) | 0~999999999 | Dword | R/W |
| 35FAH-35FBH | Export Energy Ep_exp (Sharp) | 0~999999999 | Dword | R/W |
| 35FCH-35FDH | Export Energy Ep_exp (Peak) | 0~999999999 | Dword | R/W |
| 35FEH-35FFH | Export Energy Ep_exp (Valley) | 0~999999999 | Dword | R/W |
| 3600H-3501H | Export Energy Ep_exp (Normal) | 0~999999999 | Dword | R/W |
| 3602H-3603H | Export Energy Ep_exp (Total) | 0~999999999 | Dword | R/W |
| 3604H-3605H | Ep_total (Sharp) | 0~999999999 | Dword | R/W |
| 3606H-3607H | Ep_total (Peak) | 0~999999999 | Dword | R/W |
| 3608H-3609H | Ep_total (Valley) | 0~999999999 | Dword | R/W |
| 360AH-360BH | Ep_total I (Normal) | 0~999999999 | Dword | R/W |
| 360CH-360DH | Ep_total (Total) | 0~999999999 | Dword | R/W |
| 360EH-360FH | Ep_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3610H-3611H | Ep_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3612H-3613H | Ep_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3614H-3615H | Ep_net (Normal) | -999999999~999999999 | Dword | R/W |
| 3616H-3617H | Ep_net (Total) | -999999999~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------------------------|-------------|----------|----------------|
| 3618H-3619H | Ep_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 361AH-361BH | Ep_q1 (Peak) | 0~999999999 | Dword | R/W |
| 361CH-361DH | Ep_q1 (Valley) | 0~999999999 | Dword | R/W |
| 361EH-361FH | Ep_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3620H-3621H | Ep_q1 (Total) | 0~999999999 | Dword | R/W |
| 3622H-3623H | Ep_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3624H-3625H | Ep_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3626H-3627H | Ep_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3628H-3629H | Ep_q2 (Normal) | 0~999999999 | Dword | R/W |
| 362AH-362B | Ep_q2 (Total) | 0~999999999 | Dword | R/W |
| 362CH-362DH | Ep_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 362EH-362FH | Ep_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3630H-3631H | Ep_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3632H-3633H | Ep_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3634H-3635H | Ep_q3 (Total) | 0~999999999 | Dword | R/W |
| 3636H-3637H | Ep_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3638H-3639H | Ep_q4 (Peak) | 0~999999999 | Dword | R/W |
| 363AH-363BH | Ep_q4 (Valley) | 0~999999999 | Dword | R/W |
| 363CH-363DH | Ep_q4 (Normal) | 0~999999999 | Dword | R/W |
| 363EH-363FH | Ep_q4 (Total) | 0~999999999 | Dword | R/W |
| 3640H-3641H | Inductive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 3642H-3643H | Inductive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 3644H-3645H | Inductive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3646H-3647H | Inductive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3648H-3649H | Inductive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 364AH-364BH | Capacitive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 364CH-364DH | Capacitive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 364EH-364FH | Capacitive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3650H-3651H | Capacitive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3652H-3653H | Capacitive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 3654H-3655H | Eq_total (Sharp) | 0~999999999 | Dword | R/W |
| 3656H-3657H | Eq_total (Peak) | 0~999999999 | Dword | R/W |
| 3658H-3659H | Eq_total (Valley) | 0~999999999 | Dword | R/W |
| 365AH-365BH | Eq_total (Normal) | 0~999999999 | Dword | R/W |
| 365CH-365DH | Eq_total (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-----------------|----------------------|----------|----------------|
| 365EH-365FH | Eq_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3660H-3661H | Eq_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3662H-3663H | Eq_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3664H-3665H | Eq_net (Normal) | -999999999~999999999 | Dword | R/W |
| 3666H-3667H | Eq_net (Total) | -999999999~999999999 | Dword | R/W |
| 3668H-3669H | Eq_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 366AH-366BH | Eq_q1 (Peak) | 0~999999999 | Dword | R/W |
| 366CH-366DH | Eq_q1 (Valley) | 0~999999999 | Dword | R/W |
| 366EH-366FH | Eq_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3670H-3671H | Eq_q1 (Total) | 0~999999999 | Dword | R/W |
| 3672H-3673H | Eq_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3674H-3675H | Eq_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3676H-3677H | Eq_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3678H-3679H | Eq_q2 (Normal) | 0~999999999 | Dword | R/W |
| 367AH-367BH | Eq_q2 (Total) | 0~999999999 | Dword | R/W |
| 367CH-367DH | Eq_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 367EH-367FH | Eq_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3680H-3681H | Eq_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3682H-3683H | Eq_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3684H-3685H | Eq_q3 (Total) | 0~999999999 | Dword | R/W |
| 3686H-3687H | Eq_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3688H-3689H | Eq_q4 (Peak) | 0~999999999 | Dword | R/W |
| 368AH-368BH | Eq_q4 (Valley) | 0~999999999 | Dword | R/W |
| 368CH-368DH | Eq_q4 (Normal) | 0~999999999 | Dword | R/W |
| 368EH-368FH | Eq_q4 (Total) | 0~999999999 | Dword | R/W |
| 3690H-3691H | Es_imp (Sharp) | 0~999999999 | Dword | R/W |
| 3692H-3693H | Es_imp (Peak) | 0~999999999 | Dword | R/W |
| 3694H-3695H | Es_imp (Valley) | 0~999999999 | Dword | R/W |
| 3696H-3697H | Es_imp (Normal) | 0~999999999 | Dword | R/W |
| 3698H-3699H | Es_imp (Total) | 0~999999999 | Dword | R/W |
| 369AH-369BH | Es_exp (Sharp) | 0~999999999 | Dword | R/W |
| 369CH-369DH | Es_exp (Peak) | 0~999999999 | Dword | R/W |
| 369EH-369FH | Es_exp (Valley) | 0~999999999 | Dword | R/W |
| 36A0H-36A1H | Es_exp (Normal) | 0~999999999 | Dword | R/W |
| 36A2H-36A3H | Es_exp (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|---|-------------------|----------------------|----------|----------------|
| 36A4H-36A5H | Es_total (Sharp) | 0~999999999 | Dword | R/W |
| 36A6H-36A7H | Es_total (Peak) | 0~999999999 | Dword | R/W |
| 36A8H-36A9H | Es_total (Valley) | 0~999999999 | Dword | R/W |
| 36AAH-36ABH | Es_total (Normal) | 0~999999999 | Dword | R/W |
| 36ACH-36ADH | Es_total (Total) | 0~999999999 | Dword | R/W |
| 36AEH-36AFH | Es_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 36B0H-36B1H | Es_net (Peak) | -999999999~999999999 | Dword | R/W |
| 36B2H-36B3H | Es_net (Valley) | -999999999~999999999 | Dword | R/W |
| 36B4H-36B5H | Es_net (Normal) | -999999999~999999999 | Dword | R/W |
| 36B6H-36B7H | Es_net (Total) | -999999999~999999999 | Dword | R/W |
| 36B8H-36B9H | Es_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 36BAH-36BBH | Es_q1 (Peak) | 0~999999999 | Dword | R/W |
| 36BCH-36BDH | Es_q1 (Valley) | 0~999999999 | Dword | R/W |
| 36BEH-36BFH | Es_q1 (Normal) | 0~999999999 | Dword | R/W |
| 36C0H-36C1H | Es_q1 (Total) | 0~999999999 | Dword | R/W |
| 36C2H-36C3H | Es_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 36C4H-36C5H | Es_q2 (Peak) | 0~999999999 | Dword | R/W |
| 36C6H-36C7H | Es_q2 (Valley) | 0~999999999 | Dword | R/W |
| 36C8H-36C9H | Es_q2 (Normal) | 0~999999999 | Dword | R/W |
| 36CAH-36CBH | Es_q2 (Total) | 0~999999999 | Dword | R/W |
| 36CCH-36CDH | Es_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 36CEH-36CFH | Es_q3 (Peak) | 0~999999999 | Dword | R/W |
| 36D0H-36D1H | Es_q3 (Valley) | 0~999999999 | Dword | R/W |
| 36D2H-36D3H | Es_q3 (Normal) | 0~999999999 | Dword | R/W |
| 36D4H-36D5H | Es_q3 (Total) | 0~999999999 | Dword | R/W |
| 36D6H-36D7H | Es_q4(Sharp) | 0~999999999 | Dword | R/W |
| 36D8H-36D9H | Es_q4(Peak) | 0~999999999 | Dword | R/W |
| 36DAH-36DBH | Es_q4(Valley) | 0~999999999 | Dword | R/W |
| 36DCH-36DDH | Es_q4(Normal) | 0~999999999 | Dword | R/W |
| 36DEH-36DFH | Es_q4(Total) | 0~999999999 | Dword | R/W |
| Current Month (Incremental) (High Byte in Most, Low Byte in last) | | | | |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|--------------------------------|----------------------|----------|----------------|
| 3800H-3801H | Import Energy Ep_imp (Sharp) | 0~999999999 | Dword | R/W |
| 3802H-3803H | Import Energy Ep_imp (Peak) | 0~999999999 | Dword | R/W |
| 3804H-3805H | Import Energy Ep_imp (Valley) | 0~999999999 | Dword | R/W |
| 3806H-3807H | Import Energy Ep_imp (Normal) | 0~999999999 | Dword | R/W |
| 3808H-3809H | Import Energy Ep_imp (Total) | 0~999999999 | Dword | R/W |
| 380AH-380BH | Export Energy Ep_exp (Sharp) | 0~999999999 | Dword | R/W |
| 380CH-380DH | Export Energy Ep_exp (Peak) | 0~999999999 | Dword | R/W |
| 380EH-380FH | Export Energy Ep_exp (Valley) | 0~999999999 | Dword | R/W |
| 3810H-3811H | Export Energy Ep_exp (Normal) | 0~999999999 | Dword | R/W |
| 3812H-3813H | Export Energy Ep_exp (Total) | 0~999999999 | Dword | R/W |
| 3814H-3815H | Total Energy Ep_total (Sharp) | 0~999999999 | Dword | R/W |
| 3816H-3817H | Total Energy Ep_total (Peak) | 0~999999999 | Dword | R/W |
| 3818H-3819H | Total Energy Ep_total (Valley) | 0~999999999 | Dword | R/W |
| 381AH-381BH | Total Energy Ep_total (Normal) | 0~999999999 | Dword | R/W |
| 381CH-381DH | Total Energy Ep_total (Total) | 0~999999999 | Dword | R/W |
| 381EH-381FH | Net Energy Ep_Net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3820H-3821H | Net Energy Ep_Net (Peak) | -999999999~999999999 | Dword | R/W |
| 3822H-3823H | Net Energy Ep_Net (Valley) | -999999999~999999999 | Dword | R/W |
| 3824H-3825H | Net Energy Ep_Net (Normal) | -999999999~999999999 | Dword | R/W |
| 3826H-3827H | Net Energy Ep_Net (Total) | -999999999~999999999 | Dword | R/W |
| 3828H-3829H | Ep_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 382AH-382BH | Ep_q1 (Peak) | 0~999999999 | Dword | R/W |
| 382CH-382DH | Ep_q1 (Valley) | 0~999999999 | Dword | R/W |
| 382EH-382FH | Ep_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3830H-3831H | Ep_q1 (Total) | 0~999999999 | Dword | R/W |
| 3832H-3833H | Ep_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3834H-3835H | Ep_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3836H-3837H | Ep_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3838H-3839H | Ep_q2 (Normal) | 0~999999999 | Dword | R/W |
| 383AH-383BH | Ep_q2 (Total) | 0~999999999 | Dword | R/W |
| 383CH-383DH | Ep_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 383EH-383FH | Ep_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3840H-3841H | Ep_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3842H-3843H | Ep_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3844H-3845H | Ep_q3 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|---|----------------------|----------|----------------|
| 3846H-3847H | Ep_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3848H-3849H | Ep_q4 (Peak) | 0~999999999 | Dword | R/W |
| 384AH-384BH | Ep_q4 (Valley) | 0~999999999 | Dword | R/W |
| 384CH-384DH | Ep_q4 (Normal) | 0~999999999 | Dword | R/W |
| 384EH-384FH | Ep_q4 (Total) | 0~999999999 | Dword | R/W |
| 3850H-3851H | Inductive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 3852H-3853H | Inductive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 3854H-3855H | Inductive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3856H-3857H | Inductive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3858H-3859H | Inductive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 385AH-385BH | Capacitive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 385CH-385DH | Capacitive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 385EH-385FH | Capacitive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3860H-3861H | Capacitive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3862H-3863H | Capacitive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 3864H-3865H | Total Reactive Energy Eq_total (Sharp) | 0~999999999 | Dword | R/W |
| 3866H-3867H | Total Reactive Energy Eq_total (Peak) | 0~999999999 | Dword | R/W |
| 3868H-3869H | Total Reactive Energy Eq_total (Valley) | 0~999999999 | Dword | R/W |
| 386AH-386BH | Total Reactive Energy Eq_total (Normal) | 0~999999999 | Dword | R/W |
| 386CH-386DH | Total Reactive Energy Eq_total (Total) | 0~999999999 | Dword | R/W |
| 386EH-386FH | Net Reactive Energy Eq_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3870H-3871H | Net Reactive Energy Eq_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3872H-3873H | Net Reactive Energy Eq_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3874H-3875H | Net Reactive Energy Eq_net (Normal) | -999999999~999999999 | Dword | R/W |
| 3876H-3877H | Net Reactive Energy Eq_net (Total) | -999999999~999999999 | Dword | R/W |
| 3878H-3879H | Eq_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 387AH-387BH | Eq_q1 (Peak) | 0~999999999 | Dword | R/W |
| 387CH-387DH | Eq_q1 (Valley) | 0~999999999 | Dword | R/W |
| 387EH-387FH | Eq_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3880H-3881H | Eq_q1 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|--|-------------|----------|----------------|
| 3882H-3883H | Eq_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3884H-3885H | Eq_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3886H-3887H | Eq_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3888H-3889H | Eq_q2 (Normal) | 0~999999999 | Dword | R/W |
| 388AH-388BH | Eq_q2 (Total) | 0~999999999 | Dword | R/W |
| 388CH-388DH | Eq_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 388EH-388FH | Eq_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3890H-3891H | Eq_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3892H-3893H | Eq_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3894H-3895H | Eq_q3 (Total) | 0~999999999 | Dword | R/W |
| 3896H-3897H | Eq_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3898H-3899H | Eq_q4 (Peak) | 0~999999999 | Dword | R/W |
| 389AH-389BH | Eq_q4 (Valley) | 0~999999999 | Dword | R/W |
| 389CH-389DH | Eq_q4 (Normal) | 0~999999999 | Dword | R/W |
| 389EH-389FH | Eq_q4 (Total) | 0~999999999 | Dword | R/W |
| 38A0H-38A1H | Import Apparent Energy Es_imp (Sharp) | 0~999999999 | Dword | R/W |
| 38A2H-38A3H | Import Apparent Energy Es_imp (Peak) | 0~999999999 | Dword | R/W |
| 38A4H-38A5H | Import Apparent Energy Es_imp (Valley) | 0~999999999 | Dword | R/W |
| 38A6H-38A7H | Es_imp (Normal) | 0~999999999 | Dword | R/W |
| 38A8H-38A9H | Import Apparent Energy Es_imp (Total) | 0~999999999 | Dword | R/W |
| 38AAH-38ABH | Export Apparent Energy Es_exp (Sharp) | 0~999999999 | Dword | R/W |
| 38ACH-38ADH | Export Apparent Energy Es_exp (Peak) | 0~999999999 | Dword | R/W |
| 38AEH-38AFH | Export Apparent Energy Es_exp (Valley) | 0~999999999 | Dword | R/W |
| 38B0H-38B1H | Export Apparent Energy Es_exp (Normal) | 0~999999999 | Dword | R/W |
| 38B2H-38B3H | Export Apparent Energy Es_exp (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|---|----------------------|----------|----------------|
| 38B4H-38B5H | Total Apparent Energy Es_total (Sharp) | 0~999999999 | Dword | R/W |
| 38B6H-38B7H | Total Apparent Energy Es_total (Peak) | 0~999999999 | Dword | R/W |
| 38B8H-38B9H | Total Apparent Energy Es_total (Valley) | 0~999999999 | Dword | R/W |
| 38BAH-38BBH | Total Apparent Energy Es_total (Normal) | 0~999999999 | Dword | R/W |
| 38BCH-38BDH | Total Apparent Energy Es_total (Total) | 0~999999999 | Dword | R/W |
| 38BEH-38BFH | Net Apparent Energy Es_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 38C0H-38C1H | Net Apparent Energy Es_net (Peak) | -999999999~999999999 | Dword | R/W |
| 38C2H-38C3H | Net Apparent Energy Es_net (Valley) | -999999999~999999999 | Dword | R/W |
| 38C4H-38C5H | Net Apparent Energy Es_net (Normal) | -999999999~999999999 | Dword | R/W |
| 38C6H-38C7H | Net Apparent Energy Es_net (Total) | -999999999~999999999 | Dword | R/W |
| 38C8H-38C9H | Es_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 38CAH-38CBH | Es_q1 (Peak) | 0~999999999 | Dword | R/W |
| 38CCH-38CDH | Es_q1 (Valley) | 0~999999999 | Dword | R/W |
| 38CEH-38CFH | Es_q1 (Normal) | 0~999999999 | Dword | R/W |
| 38D0H-38D1H | Es_q1 (Total) | 0~999999999 | Dword | R/W |
| 38D2H-38D3H | Es_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 38D4H-38D5H | Es_q2 (Peak) | 0~999999999 | Dword | R/W |
| 38D6H-38D7H | Es_q2 (Valley) | 0~999999999 | Dword | R/W |
| 38D8H-38D9H | Es_q2 (Normal) | 0~999999999 | Dword | R/W |
| 38DAH-38DBH | Es_q2 (Total) | 0~999999999 | Dword | R/W |
| 38DCH-38DDH | Es_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 38DEH-38DFH | Es_q3 (Peak) | 0~999999999 | Dword | R/W |
| 38E0H-38E1H | Es_q3 (Valley) | 0~999999999 | Dword | R/W |
| 38E2H-38E3H | Es_q3 (Normal) | 0~999999999 | Dword | R/W |
| 38E4H-38E5H | Es_q3 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|---|--------------------------------|----------------------|----------|----------------|
| 38E6H-38E7H | Es_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 38E8H-38E9H | Es_q4 (Peak) | 0~999999999 | Dword | R/W |
| 38EAH-38EBH | Es_q4 (Valley) | 0~999999999 | Dword | R/W |
| 38ECH-38EDH | Es_q4 (Normal) | 0~999999999 | Dword | R/W |
| 38EEH-38EFH | Es_q4 (Total) | 0~999999999 | Dword | R/W |
| Prior Month (Incremental) (High Byte in Most, Low Byte in last) | | | | |
| 38F0H-38F1H | Import Energy Ep_imp (Sharp) | 0~999999999 | Dword | R/W |
| 38F2H-38F3H | Import Energy Ep_imp (Peak) | 0~999999999 | Dword | R/W |
| 38F4H-38F5H | Import Energy Ep_imp (Valley) | 0~999999999 | Dword | R/W |
| 38F6H-38F7H | Import Energy Ep_imp (Normal) | 0~999999999 | Dword | R/W |
| 38F8H-38F9H | Import Energy Ep_imp (Total) | 0~999999999 | Dword | R/W |
| 38FAH-38FBH | Export Energy Ep_exp (Sharp) | 0~999999999 | Dword | R/W |
| 38FCH-38FDH | Export Energy Ep_exp (Peak) | 0~999999999 | Dword | R/W |
| 38FEH-38FFH | Export Energy Ep_exp (Valley) | 0~999999999 | Dword | R/W |
| 3900H-3901H | Export Energy Ep_exp (Normal) | 0~999999999 | Dword | R/W |
| 3902H-3903H | Export Energy Ep_exp (Total) | 0~999999999 | Dword | R/W |
| 3904H-3905H | Total Energy Ep_total (Sharp) | 0~999999999 | Dword | R/W |
| 3906H-3907H | Total Energy Ep_total (Peak) | 0~999999999 | Dword | R/W |
| 3908H-3909H | Total Energy Ep_total (Valley) | 0~999999999 | Dword | R/W |
| 390AH-390BH | Total Energy Ep_total (Normal) | 0~999999999 | Dword | R/W |
| 390CH-390DH | Total Energy Ep_total (Total) | 0~999999999 | Dword | R/W |
| 390EH-390FH | Net Energy Ep_Net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3910H-3911H | Net Energy Ep_Net (Peak) | -999999999~999999999 | Dword | R/W |
| 3912H-3913H | Net Energy Ep_Net (Valley) | -999999999~999999999 | Dword | R/W |
| 3914H-3915H | Net Energy Ep_Net (Normal) | -999999999~999999999 | Dword | R/W |
| 3916H-3917H | Net Energy Ep_Net (Total) | -999999999~999999999 | Dword | R/W |
| 3918H-3919H | Ep_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 391AH-391BH | Ep_q1 (Peak) | 0~999999999 | Dword | R/W |
| 391CH-391DH | Ep_q1 (Valley) | 0~999999999 | Dword | R/W |
| 391EH-391FH | Ep_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3920H-3921H | Ep_q1 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------------------------|-------------|----------|----------------|
| 3922H-3923H | Ep_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3924H-3925H | Ep_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3926H-3927H | Ep_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3928H-3929H | Ep_q2 (Normal) | 0~999999999 | Dword | R/W |
| 392AH-392B | Ep_q2 (Total) | 0~999999999 | Dword | R/W |
| 392CH-392DH | Ep_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 392EH-392FH | Ep_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3930H-3931H | Ep_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3932H-3933H | Ep_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3934H-3935H | Ep_q3 (Total) | 0~999999999 | Dword | R/W |
| 3936H-3937H | Ep_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3938H-3939H | Ep_q4 (Peak) | 0~999999999 | Dword | R/W |
| 393AH-393BH | Ep_q4 (Valley) | 0~999999999 | Dword | R/W |
| 393CH-393DH | Ep_q4 (Normal) | 0~999999999 | Dword | R/W |
| 393EH-393FH | Ep_q4 (Total) | 0~999999999 | Dword | R/W |
| 3940H-3941H | Inductive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 3942H-3943H | Inductive Reactive Energy(Peak) | 0~999999999 | Dword | R/W |
| 3944H-3945H | Inductive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3946H-3947H | Inductive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3948H-3949H | Inductive Reactive Energy (Total) | 0~999999999 | Dword | R/W |
| 394AH-394BH | Capacitive Reactive Energy (Sharp) | 0~999999999 | Dword | R/W |
| 394CH-394DH | Capacitive Reactive Energy (Peak) | 0~999999999 | Dword | R/W |
| 394EH-394FH | Capacitive Reactive Energy (Valley) | 0~999999999 | Dword | R/W |
| 3950H-3951H | Capacitive Reactive Energy (Normal) | 0~999999999 | Dword | R/W |
| 3952H-3953H | Capacitive Reactive Energy (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|---|----------------------|----------|----------------|
| 3954H-3955H | Total Reactive Energy Eq_total (Sharp) | 0~999999999 | Dword | R/W |
| 3956H-3957H | Total Reactive Energy Eq_total (Peak) | 0~999999999 | Dword | R/W |
| 3958H-3959H | | 0~999999999 | Dword | R/W |
| 395AH-395BH | Total Reactive Energy Eq_total (Valley) | 0~999999999 | Dword | R/W |
| 395CH-395DH | Total Reactive Energy Eq_total (Normal) | 0~999999999 | Dword | R/W |
| | Total Reactive Energy Eq_total (Total) | | | |
| 395EH-395FH | Net Reactive Energy Eq_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 3960H-3961H | Net Reactive Energy Eq_net (Peak) | -999999999~999999999 | Dword | R/W |
| 3962H-3963H | | -999999999~999999999 | Dword | R/W |
| 3964H-3965H | Net Reactive Energy Eq_net (Valley) | -999999999~999999999 | Dword | R/W |
| 3966H-3967H | Net Reactive Energy Eq_net (Normal) | -999999999~999999999 | Dword | R/W |
| | Net Reactive Energy Eq_net (Total) | | | |
| 3968H-3969H | Eq_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 396AH-396BH | Eq_q1 (Peak) | 0~999999999 | Dword | R/W |
| 396CH-396DH | Eq_q1 (Valley) | 0~999999999 | Dword | R/W |
| 396EH-396FH | Eq_q1 (Normal) | 0~999999999 | Dword | R/W |
| 3970H-3971H | Eq_q1 (Total) | 0~999999999 | Dword | R/W |
| 3972H-3973H | Eq_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 3974H-3975H | Eq_q2 (Peak) | 0~999999999 | Dword | R/W |
| 3976H-3977H | Eq_q2 (Valley) | 0~999999999 | Dword | R/W |
| 3978H-3979H | Eq_q2 (Normal) | 0~999999999 | Dword | R/W |
| 397AH-397BH | Eq_q2 (Total) | 0~999999999 | Dword | R/W |
| 397CH-397DH | Eq_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 397EH-397FH | Eq_q3 (Peak) | 0~999999999 | Dword | R/W |
| 3980H-3981H | Eq_q3 (Valley) | 0~999999999 | Dword | R/W |
| 3982H-3983H | Eq_q3 (Normal) | 0~999999999 | Dword | R/W |
| 3984H-3985H | Eq_q3 (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|---|-------------|----------|----------------|
| 3986H-3987H | Eq_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 3988H-3989H | Eq_q4 (Peak) | 0~999999999 | Dword | R/W |
| 398AH-398BH | Eq_q4(Valley) | 0~999999999 | Dword | R/W |
| 398CH-398DH | Eq_q4 (Normal) | 0~999999999 | Dword | R/W |
| 398EH-398FH | Eq_q4 (Total) | 0~999999999 | Dword | R/W |
| 3990H-3991H | Import Apparent Energy Es_imp (Sharp) | 0~999999999 | Dword | R/W |
| 3992H-3993H | Import Apparent Energy Es_imp (Peak) | 0~999999999 | Dword | R/W |
| 3994H-3995H | Import Apparent Energy Es_imp (Valley) | 0~999999999 | Dword | R/W |
| 3996H-3997H | Es_imp (Normal) | 0~999999999 | Dword | R/W |
| 3998H-3999H | Import Apparent Energy Es_imp (Total) | 0~999999999 | Dword | R/W |
| 399AH-399BH | Export Apparent Energy Es_exp (Sharp) | 0~999999999 | Dword | R/W |
| 399CH-399DH | Export Apparent Energy Es_exp (Peak) | 0~999999999 | Dword | R/W |
| 399EH-399FH | Export Apparent Energy Es_exp (Valley) | 0~999999999 | Dword | R/W |
| 39A0H-39A1H | Export Apparent Energy Es_exp (Normal) | 0~999999999 | Dword | R/W |
| 39A2H-39A3H | Export Apparent Energy Es_exp (Total) | 0~999999999 | Dword | R/W |
| 39A4H-39A5H | Total Apparent Energy Es_total (Sharp) | 0~999999999 | Dword | R/W |
| 39A6H-39A7H | Total Apparent Energy Es_total (Peak) | 0~999999999 | Dword | R/W |
| 39A8H-39A9H | Total Apparent Energy Es_total (Valley) | 0~999999999 | Dword | R/W |
| 39AAH-39ABH | Total Apparent Energy Es_total (Normal) | 0~999999999 | Dword | R/W |
| 39ACH-39ADH | Total Apparent Energy Es_total (Total) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Datatype | Type of access |
|-------------|-------------------------------------|----------------------|----------|----------------|
| 39AEH-39AFH | Net Apparent Energy Es_net (Sharp) | -999999999~999999999 | Dword | R/W |
| 39B0H-39B1H | Net Apparent Energy Es_net (Peak) | -999999999~999999999 | Dword | R/W |
| 39B2H-39B3H | Net Apparent Energy Es_net (Valley) | -999999999~999999999 | Dword | R/W |
| 39B4H-39B5H | Net Apparent Energy Es_net (Normal) | -999999999~999999999 | Dword | R/W |
| 39B6H-39B7H | Net Apparent Energy Es_net (Total) | -999999999~999999999 | Dword | R/W |
| 39B8H-39B9H | Es_q1 (Sharp) | 0~999999999 | Dword | R/W |
| 39BAH-39BBH | Es_q1 (Peak) | 0~999999999 | Dword | R/W |
| 39BCH-39BDH | Es_q1 (Valley) | 0~999999999 | Dword | R/W |
| 39BEH-39BFH | Es_q1 (Normal) | 0~999999999 | Dword | R/W |
| 39C0H-39C1H | Es_q1 (Total) | 0~999999999 | Dword | R/W |
| 39C2H-39C3H | Es_q2 (Sharp) | 0~999999999 | Dword | R/W |
| 39C4H-39C5H | Es_q2 (Peak) | 0~999999999 | Dword | R/W |
| 39C6H-39C7H | Es_q2 (Valley) | 0~999999999 | Dword | R/W |
| 39C8H-39C9H | Es_q2 (Normal) | 0~999999999 | Dword | R/W |
| 39CAH-39CBH | Es_q2 (Total) | 0~999999999 | Dword | R/W |
| 39CCH-39CDH | Es_q3 (Sharp) | 0~999999999 | Dword | R/W |
| 39CEH-39CFH | Es_q3 (Peak) | 0~999999999 | Dword | R/W |
| 39D0H-39D1H | Es_q3 (Valley) | 0~999999999 | Dword | R/W |
| 39D2H-39D3H | Es_q3 (Normal) | 0~999999999 | Dword | R/W |
| 39D4H-39D5H | Es_q3 (Total) | 0~999999999 | Dword | R/W |
| 39D6H-39D7H | Es_q4 (Sharp) | 0~999999999 | Dword | R/W |
| 39D8H-39D9H | Es_q4 (Peak) | 0~999999999 | Dword | R/W |
| 39DAH-39DBH | Es_q4 (Valley) | 0~999999999 | Dword | R/W |
| 39DCH-39DDH | Es_q4 (Normal) | 0~999999999 | Dword | R/W |
| 39DEH-39DFH | Es_q4 (Total) | 0~999999999 | Dword | R/W |

The Daily Energy

Function code: 03H for reading. The address table as below.

Table 5-27 Daily Energy

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|----------------------|-------------|-----------|----------------|
| 3C00H-3C01H | Ep_imp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C02H-3C03H | Ep_exp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C04H-3C05H | Ep_total (Yesterday) | 0~999999999 | Dword | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|----------------------|-----------|----------------|
| 3C06H-3C07H | Ep_net (Yesterday) | -999999999~999999999 | Dword | R/W |
| 3C08H-3C09H | Ep_q1 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C0AH-3C0BH | Ep_q2 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C0CH-3C0DH | Ep_q3 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C0EH-3C0FH | Ep_q4 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C10H-3C11H | Eq_imp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C12H-3C13H | Eq_exp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C14H-3C15H | Eq_total (Yesterday) | 0~999999999 | Dword | R/W |
| 3C16H-3C17H | Eq_net (Yesterday) | -999999999~999999999 | Dword | R/W |
| 3C18H-3C19H | Eq_q1 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C1AH-3C1BH | Eq_q2 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C1CH-3C1DH | Eq_q3 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C1EH-3C1FH | Eq_q4 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C20H-3C21H | Es_imp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C22H-3C23H | Es_exp (Yesterday) | 0~999999999 | Dword | R/W |
| 3C24H-3C25H | Es_total (Yesterday) | 0~999999999 | Dword | R/W |
| 3C26H-3C27H | Es_net (Yesterday) | -999999999~999999999 | Dword | R/W |
| 3C28H-3C29H | Es_q1 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C2AH-3C2BH | Es_q2 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C2CH-3C2DH | Es_q3 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C2EH-3C2FH | Es_q4 (Yesterday) | 0~999999999 | Dword | R/W |
| 3C30H-3C5FH | Daily Energy (Day before yesterday) | Same As Above | Dword | R/W |
| 3C60H-3C8FH | Daily Energy (Three days ago) | Same As Above | Dword | R/W |
| 3C90H-3CBFH | Daily Energy (Four days ago) | Same As Above | Dword | R/W |
| 3CC0H-3CEFH | Daily Energy (Five days ago) | Same As Above | Dword | R/W |
| 3CF0H-3D1FH | Daily Energy (Six days ago) | Same As Above | Dword | R/W |
| 3D20H-3D4FH | Daily Energy (Seven days ago) | Same As Above | Dword | R/W |

The maximum demand of power, reactive power, apparent power, and currents for different rates can be accessed via communication. Function code: 03H for reading. The address table as below.

Table 5-28 TOU Maximum Demand Parameters Address Table

| Address | Parameter | Data Range | Data type | Type of access |
|---------|---|------------|-----------|----------------|
| 3B00H | Time Stamp-Year of Max Import Power demand (Sharp) | 00~99 | word | R |
| | Time Stamp-Month of Max Import Power demand (Sharp) | 1~12 | | R |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|---|--|---------------|----------------|
| 3B01H | Time Stamp-Day of Max Import Power demand (Sharp) | 1~31 | word | R |
| | Time Stamp-Hour of Max Import Power demand (Sharp) | 0~23 | | R |
| 3B02H | Time Stamp-Minute of Max Import Power demand (Sharp) | 0~59 | word | R |
| | Time Stamp-Second of Max Import Power demand (Sharp) | 0~59 | | R |
| 3B03H | Max Import Power demand (Sharp) | -32768~32767 | Integer | R |
| 3B04H-3B07H | Time Stamp and Max Import Power Demand (Peak) | Same As Above | Integer | R |
| 3B08H-3B0BH | | Same As Above | Integer | R |
| 3B0CH-3B0FH | | Time Stamp and Max Import Power Demand (Valley) | Same As Above | Integer |
| 3B10H-3B13H | Time Stamp and Max Import Power Demand (Normal) | Same As Above | Integer | R |
| | Time Stamp and Max Import Power Demand (Total) | | | |
| 3B14H-3B17H | Time Stamp and Max Export Power Demand (Sharp) | Same As Above | Integer | R |
| 3B18H-3B1BH | | Same As Above | Integer | R |
| 3B1CH-3B1FH | Time Stamp and Max Export Power Demand (Peak) | Same As Above | Integer | R |
| 3B20H-3B23H | Time Stamp and Max Export Power Demand (Valley) | Same As Above | Integer | R |
| 3B24H-3B27H | Time Stamp and Max Export Power Demand (Normal) | Same As Above | Integer | R |
| | Time Stamp and Max Export Power Demand (Total) | | | |
| 3B28H-3B2BH | Time Stamp and Max Inductive Reactive Demand (Sharp) | Same As Above | Integer | R |
| 3B2CH-3B2FH | | Time Stamp and Max Inductive ReactiveDemand (Peak) | Same As Above | Integer |
| 3B30H-3B33H | Time Stamp and Max Inductive Reactive Demand (Valley) | Same As Above | Integer | R |
| 3B34H-3B37H | Time Stamp and Max Inductive Reactive Demand (Normal) | Same As Above | Integer | R |
| 3B38H-3B3BH | Time Stamp and Max Inductive Reactive Demand (Total) | Same As Above | Integer | R |

| Address | Parameter | Data Range | Data type | Type of access | |
|-------------|---|--|---------------|----------------|---|
| 3B3CH-3B3FH | Time Stamp and Max Capacitive Reactive Demand (Sharp) | Same As Above | Integer | R | |
| 3B40H-3B43H | | Time Stamp and Max Capacitive ReactiveDemand (Peak) | Same As Above | Integer | R |
| 3B44H-3B47H | | Time Stamp and Max Capacitive Reactive Demand (Valley) | Same As Above | Integer | R |
| 3B48H-3B4BH | | Time Stamp and Max Capacitive Reactive Demand (Normal) | Same As Above | Integer | R |
| 3B4CH-3B4FH | | Time Stamp and Max Capacitive Reactive Demand (Total) | Same As Above | Integer | R |
| 3B50H-3B53H | Time Stamp and Max Import Apparent Demand (Sharp) | Same As Above | Integer | R | |
| 3B54H-3B57H | | Time Stamp and Max Import Apparent Demand (Peak) | Same As Above | Integer | R |
| 3B58H-3B5BH | | Time Stamp and Max Import Apparent Demand (Valley) | Same As Above | Integer | R |
| 3B5CH-3B5FH | | Time Stamp and Max Import Apparent Demand (Normal) | Same As Above | Integer | R |
| 3B60H-3B63H | | Time Stamp and Max Import Apparent Demand (Total) | Same As Above | Integer | R |
| 3B64H-3B67H | Time Stamp and Max Export Apparent Demand (Sharp) | Same As Above | Integer | R | |
| 3B68H-3B6BH | | Time Stamp and Max Export Apparent Demand (Peak) | Same As Above | Integer | R |
| 3B6CH-3B6FH | | Time Stamp and Max Export Apparent Demand (Valley) | Same As Above | Integer | R |
| 3B70H-3B73H | | Time Stamp and Max Export Apparent Demand (Normal) | Same As Above | Integer | R |
| 3B74H-3B77H | | Time Stamp and Max Export Apparent Demand (Total) | Same As Above | Integer | R |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|---------------------------------------|---------------|-----------|----------------|
| 3B78H-3B7BH | Time Stamp and Max I1 Demand (Sharp) | Same As Above | Integer | R |
| 3B7CH-3B7FH | Time Stamp and Max I1 Demand (Peak) | Same As Above | Integer | R |
| 3B80H-3B83H | Time Stamp and Max I1 Demand (Valley) | Same As Above | Integer | R |
| 3B84H-3B87H | Time Stamp and Max I1 Demand (Normal) | Same As Above | Integer | R |
| 3B88H-3B8BH | Time Stamp and Max I1 Demand (Total) | Same As Above | Integer | R |
| 3B8CH-3B8FH | Time Stamp and Max I2 Demand (Sharp) | Same As Above | Integer | R |
| 3B90H-3B93H | Time Stamp and Max I2 Demand (Peak) | Same As Above | Integer | R |
| 3B94H-3B97H | Time Stamp and Max I2 Demand (Valley) | Same As Above | Integer | R |
| 3B98H-3B9BH | Time Stamp and Max I2 Demand (Normal) | Same As Above | Integer | R |
| 3B9CH-3B9FH | Time Stamp and Max I2 Demand (Total) | Same As Above | Integer | R |
| 3BA0H-3BA3H | Time Stamp and Max I3 Demand (Sharp) | Same As Above | Integer | R |
| 3BA4H-3BA7H | Time Stamp and Max I3 Demand (Peak) | Same As Above | Integer | R |
| 3BA8H-3BABH | Time Stamp and Max I3 Demand (Valley) | Same As Above | Integer | R |
| 3BACH-3BAFH | Time Stamp and Max I3 Demand (Normal) | Same As Above | Integer | R |
| 3BB0H-3BB3H | Time Stamp and Max I3 Demand (Total) | Same As Above | Integer | R |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|---------------------------------------|---------------|-----------|----------------|
| 3BB4H-3BB7H | Time Stamp and Max IN Demand (Sharp) | Same As Above | Integer | R |
| 3BB8H-3BBBH | Time Stamp and Max IN Demand (Peak) | Same As Above | Integer | R |
| 3BBCH-3BBFH | Time Stamp and Max IN Demand (Valley) | Same As Above | Integer | R |
| 3BC0H-3BC3H | Time Stamp and Max IN Demand (Normal) | Same As Above | Integer | R |
| 3BC4H-3BC7H | Time Stamp and Max IN Demand (Total) | Same As Above | Integer | R |

Data address of TOU parameter setting includes the basis parameter of TOU, the time zone setting parameter of TOU, the time table setting parameter of TOU, and the holiday setting parameter of TOU. Function: 03H for reading, 10H for writing.

Table 5-29 TOU Parameter Address Table

| Address | Parameter | Data Range | Data type | Type of access |
|---|----------------------------|---|-----------|----------------|
| Sharing power setting parameters: 03H read; 10H Write | | | | |
| 1120H | The Number of Season | 0~12 | Word | R/W |
| 1121H | The Number of TOU Schedule | 0~14 | Word | R/W |
| 1122H | The Number of TOU Segment | 0~14 | Word | R/W |
| 1123H | The Number of Tariff | 0~3 | Word | R/W |
| 1124H | Weekend Setting | 0~127 (bit0---Sun: bit1~bit6: Mon ~ Sat; 0: Disable; 1: Enable) | Word | R/W |
| 1125H | Weekend Schedule | 0-14 | Word | R/W |
| 1126H | Holiday Setting | 0-30 | Word | R/W |
| 1127H | Enable TOU | 1: Enable Others: Disable | Word | R/W |
| 1128H | Restore to Defaults | 1: Enable Others: Disable | Word | R/W |
| 1129H | Monthly Billing Mode | 0: End of Month 1: Assign | Word | R/W |
| 112AH | Billing Time - Day | 1~28 | Word | R/W |
| 112BH | Billing Time - Hour | 0~23 | Word | R/W |
| 112CH | Billing Time - Minute | 0~59 | Word | R/W |
| 112DH | Billing Time - Second | 0~59 | Word | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|---|-----------|----------------|
| 112EH | Fault Status Word | 0: No Error; 1: Tariff Error; 2: Season Error; 4: Segment Error; 8: The Number of Season Error; 16: Season Setting Error; 32: The Number of Holiday Error; 64: Holiday Setting Error; 256: Tariff in TOU Schedule Error; 512: Time In TOU Schedule Error; 1024: Time Segment In TOU Schedule Error; 2048: Weekend Schedule Error; 4096: Weekend Error | Word | R |
| 112FH | Enable Holiday Years Setting | 1: Enable; 0: Disable | Word | R/W |
| 1130H | Start Year of Holiday Years | | Word | R/W |
| 1131H | End Year of Holiday Years | | Word | R/W |
| 1140H-1142H | TOU Seasons 1 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1143H-1145H | TOU Seasons 2 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1146H-1148H | TOU Seasons 3 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1149H-114BH | TOU Seasons 4 Start Time (Month, Day, and Hour) | | Word | R/W |
| 114CH-114EH | TOU Seasons 5 Start Time (Month, Day, and Hour) | | Word | R/W |
| 114FH-1151H | TOU Seasons 6 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1152H-1154H | TOU Seasons 7 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1155H-1157H | TOU Seasons 8 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1158H-115A | TOU Seasons 9 Start Time (Month, Day, and Hour) | | Word | R/W |
| 115BH-115D | TOU Seasons 10 Start Time (Month, Day, and Hour) | | Word | R/W |
| 115EH-1160H | TOU Seasons 11 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1161H-1163H | TOU Seasons 12 Start Time (Month, Day, and Hour) | | Word | R/W |
| 1164H-1166H | First TOU Schedule 1 Segment Start Time (Hour, Minute and Tariff) | | Word | R/W |
| 1167H-1169H | First TOU Schedule 2 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 116AH-116CH | First TOU Schedule 3 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|----------------------------|-----------|----------------|
| 116DH-116FH | First TOU Schedule 4 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1170H-1172H | First TOU Schedule 5 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1173H-1175H | First TOU Schedule 6 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1176H-1178H | First TOU Schedule 7 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1179H-117BH | First TOU Schedule 8 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 117CH-117EH | First TOU Schedule 9 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 117FH-1181H | First TOU Schedule 10 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1182H-1184H | First TOU Schedule 11 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1185H-1187H | First TOU Schedule 12 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 1188H-118AH | First TOU Schedule 13 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 118BH-118DH | First TOU Schedule 14 Segment Start Time (Hour, Minute, and Tariff) | | Word | R/W |
| 118EH-11B7H | Second TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 11B8H-11E1H | Third TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 11E2H-120B | Fourth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 120CH-1235H | Fifth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 1236H-125FH | Sixth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|----------------------------|-----------|----------------|
| 1260H-1289H | Seventh TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 128AH-12B3H | Eighth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 12B4H-12DDH | Ninth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 12DEH-1307H | Tenth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 1308H-1331H | Eleventh TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 1332H-135BH | Twelfth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 135CH-1385H | Thirteenth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 1386H-13AFH | Fourteenth TOU Schedule 1~14 Segment Start Time (Hour, Minute, and Tariff) | Same As First TOU Schedule | Word | R/W |
| 13B0H-13B2H | Holidays 1 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13B3H-13B5H | Holidays 2 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13B6H-13B8H | Holidays 3 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13B9H-13BBH | Holidays 4 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13BCH-13BEH | Holidays 5 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13BFH-13C1H | Holidays 6 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13C2H-13C4H | Holidays 7 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13C5H-13C7H | Holidays 8 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|------------|-----------|----------------|
| 13C8H-13CAH | Holidays 9 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13CBH-13CDH | Holidays 10 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13CEH-13D0H | Holidays 11 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13D1H-13D3H | Holidays 12 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13D4H-13D6H | Holidays 13 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13D7H-13D9H | Holidays 14 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13DAH-13DCH | Holidays 15 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13DDH-13DFH | Holidays 16 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13E0H-13E2H | Holidays 17 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13E3H-13E5H | Holidays 18 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13E6H-13E8H | Holidays 19 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13E9H-13EBH | Holidays 20 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13ECH-13EEH | Holidays 21 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13EFH-13F1H | Holidays 22 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13F2H-13F4H | Holidays 23 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13F5H-13F7H | Holidays 24 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |

| Address | Parameter | Data Range | Data type | Type of access |
|-------------|--|------------|-----------|----------------|
| 13F8H-13FAH | Holidays 25 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13FBH-13FDH | Holidays 26 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 13FEH-1400H | Holidays 27 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 1401H-1403H | Holidays 28 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 1404H-1406H | Holidays 29 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 1407H-1409H | Holidays 30 Table (Month, Day, and The Number of TOU Schedule) | | Word | R/W |
| 140AH-14FFH | Reserve | | Word | R/W |

The address area includes ten years of holiday settings, Function: 03H for reading, 10H for writing.

Table 5-30 Data Address of Ten Years Holiday

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| First Year Holidays; 03H read; 10H Write | | | |
| 1500H-1502H | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1503H-1505H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1506H-1508H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1509H-150BH | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 150CH-150EH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 150FH-1511H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1512H-1514H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1515H-1517H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1518H-151AH | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 151BH-151DH | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 151EH-1520H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1521H-1523H | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1524H-1526H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1527H-152AH | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 152AH-152CH | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 152DH-152FH | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|---|---|-----------|----------------|
| 1530H-1532H | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1533H-1535H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1536H-1538H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1539H-153B | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 153CH-153EH | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 153FH-1541H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1542H-1544H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1545H-1547H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1548H-154AH | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 154BH-154D | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 154EH-1550H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1551H-1553H | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1554H-1556H | Holiday 29Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1557H-1559H | Holiday 30Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 155AH | The First Year | word | R/W |
| 155BH | The Amount Number of Holidays in First Year | word | R/W |
| Second Year Holidays; 03H read; 10H Write | | | |
| 155CH-155EH | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 155FH-1561H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1562H-1564H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1565H-1567H | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1568H-156AH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 156BH-156DH | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 156EH-1570H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1571H-1573H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1574H-1576H | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1577H-1579H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 157AH-157C | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 157DH-157FH | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1580H-1582H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1583H-1585H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1586H-1588H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1589H-158BH | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 158CH-158EH | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 158FH-1591H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| 1592H-1594H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1595H-1597H | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1598H-159AH | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 159BH-159DH | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 159EH-15A0H | Holiday 23Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15A1H-15A3H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15A4H-15A6H | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15A7H-15A9H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15AAH-15ACH | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15ADH-15AFH | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15B0H-15B2H | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15B3H-15B5H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15B6H | The Second Year | word | R/W |
| 15B7H | The Amount Number of Holidays in Second Year | word | R/W |
| Third Year Holidays; 03H read; 10H Write | | | |
| 15B8H-15BAH | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15BBH-15BDH | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15BEH-15C0H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15C1H-15C3H | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15C4H-15C6H | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15C7H-15C9H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15CAH-15CBH | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15CDH-15CFH | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15D0H-15D2H | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15D3H-15D5H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15D6H-15D8H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15D9H-15DBH | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15DCH-15DEH | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15DFH-15E1H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15E2H-15E4H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15E5H-15E7H | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15E8H-15EAH | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15EBH-15EDH | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15EEH-15F0H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15F1H-15F3H | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|---|---|-----------|----------------|
| 15F4H-15F6H | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15F7H-15F9H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15FAH-15FCH | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 15FDH-15FFH | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1600H-1602H | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1603H-1605H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1606H-1608H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1609H-160BH | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 160CH-160EH | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 160FH-1611H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1612H | The Third Year | word | R/W |
| 1613H | The Amount Number of Holidays in Third Year | word | R/W |
| Fourth Year Holidays; 03H read; 10H Write | | | |
| 1614H-1616H | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1617H-1619H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 161AH-161CH | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 161DH-161FH | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1620H-1622H | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1623H-1625H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1626H-1628H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1629H-162B | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 162CH-162EH | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 162FH-1631H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1632H-1634H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1635H-1637H | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1638H-163AH | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 163BH-163DH | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 163EH-1640H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1641H-1643H | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1644H-1646H | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1647H-1649H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 164AH-164CH | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 164DH-164FH | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1650H-1652H | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1653H-1655H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|-------------|---|-----------|----------------|
| 1656H-1658H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1659H-165BH | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 165CH-165EH | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 165FH-1661H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1662H-1664H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1665H-1667H | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1668H-166AH | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 166BH-166DH | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 166EH | The Fourth Year | word | R/W |
| 166FH | The Amount Number of Holidays in Fourth Year | word | R/W |
| | Fifth Year Holidays; 03H read; 10H Write | | |
| 1670H-1672H | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1673H-1675H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1676H-1678H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1679H-167BH | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 167CH-167EH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 167FH-1681H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1682H-1684H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1685H-1687H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1688H-168AH | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 168BH-168DH | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 168EH-1690H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1691H-1693H | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1694H-1696H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1697H-1699H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 169AH-169CH | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 169DH-169FG | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16A0H-16A2H | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16A3H-16A5H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16A6H-16A8H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16A9H-16ABH | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16ACH-16AE | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16AFH-16B1H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16B2H-16B4H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16B5H-16B7H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| 16B8H-16BAH | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16BBH-16BDH | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16BEH-16C0H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16C1H-16C3H | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16C4H-16C6H | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16C7H-16C9H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16CAH | The Fifth Year | word | R/W |
| 16CBH | The Amount Number of Holidays in Fifth Year | word | R/W |
| Sixth Year Holidays; 03H read; 10H Write | | | |
| 16CCH-16CEH | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16CFH-16D1H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16D2H-16D4H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16D5H-16D7H | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16D8H-16DAH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16DBH-16DDH | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16DEH-16E0H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16E1H-16E3H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16E4H-16E6H | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16E7H-16E9H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16EAH-16ECH | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16EDH-16EFH | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16F0H-16F2H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16F3H-16F5H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16F6H-16F8H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16F9H-16FBH | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16FCH-16FEH | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 16FFH-1701H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1702H-1704H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1705H-1707H | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1708H-170AH | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 170BH-170DH | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 170EH-1710H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1711H-1713H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1714H-1716H | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1717H-1719H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| 171AH-171CH | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 171DH-171FH | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1720H-1722H | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1723H-1725H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1726H | The Sixth Year | word | R/W |
| 1727H | The Amount Number of Holidays in Sixth Year | word | R/W |
| Seventh Year Holidays; 03H read; 10H Write | | | |
| 1728H-172AH | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 172BH-172DH | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 172EH-1730H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1731H-1733H | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1734H-1736H | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1737H-1739H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 173AH-173CH | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 173DH-173FH | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1740H-1742H | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1743H-1745H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1746H-1748H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1749H-174BH | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 174CH-174EH | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 174FH-1751H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1752H-1754H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1755H-1757H | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1758H-175AH | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 175BH-175DH | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 175EH-1760H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1761H-1763H | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1764H-1766H | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1767H-1769H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 176AH-176CH | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 176DH-176FH | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1770H-1772H | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1773H-1775H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1776H-1778H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1779H-177BH | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|---|---|-----------|----------------|
| 177CH-177EH | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 177FH-1781H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1782H | The Seventh Year | word | R/W |
| 1783H | The Amount Number of Holidays in Seventh Year | word | R/W |
| Eighth Year Holidays; 03H read; 10H Write | | | |
| 1784H-1786H | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1787H-1789H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 178AH-178CH | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 178DH-178FH | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1790H-1792H | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1793H-1795H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1796H-1798H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1799H-179BH | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 179CH-179EH | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 179FH-17A1H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17A2H-17A4H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17A5H-17A7H | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17A8H-17AAH | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17ABH-17ADH | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17AEH-17B0H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17B1H-17B3H | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17B4H-17B6H | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17B7H-17B9H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17BAH-17BCH | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17BDH-17BFH | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17C0H-17C2H | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17C3H-17C5H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17C6H-17C8H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17C9H-17CBH | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17CCH-17CDH | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17CFH-17D1H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17D2H-17D4H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17D5H-17D7H | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17D8H-17DAH | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17DBH-17DDH | Holiday 30 Table (Month, Day and The Number of TOU Schedule) | word | R/W |

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| 17DEH | The Eighth Year | word | R/W |
| 17DFH | The Amount Number of Holidays in Eighth Year | word | R/W |
| Ninth Year Holidays; 03H read; 10H Write | | | |
| 17E0H-17E2H | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17E3H-17E5H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17E6H-17E8H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17E9H-17EBH | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17ECH-17EEH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17EFH-17F1H | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17F2H-17F4H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17F5H-17F7H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17F8H-17FAH | Holiday 9 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17FBH-17FDH | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 17FEH-1800H | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1801H-1803H | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1804H-1806H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1807H-1809H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 180AH-180CH | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 180DH-180FH | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1810H-1812H | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1813H-1815H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1816H-1818H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1819H-181BH | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 181CH-181EH | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 181FH-1821H | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1822H-1824H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1825H-1827H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1828H-182A | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 182BH-182DH | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 182EH-1830H | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1831H-1833H | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1834H-1836H | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1837H-1839H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 183AH | The Ninth Year | word | R/W |
| 183BH | The Amount Number of Holidays in Ninth Year | word | R/W |

| Address | Parameter | Data Type | Type of access |
|--|---|-----------|----------------|
| Tenth Year Holidays; 03H read; 10H Write | | | |
| 183CH-183EH | Holiday 1 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 183FH-1841H | Holiday 2 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1842H-1844H | Holiday 3 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1845H-1847H | Holiday 4 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1848H-184AH | Holiday 5 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 184BH-184DH | Holiday 6 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 184EH-1850H | Holiday 7 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1851H-1853H | Holiday 8 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1854H-1856H | Holiday 9 Table (Month, Day and The Number of TOU Schedule) | word | R/W |
| 1857H-1859H | Holiday 10 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 185AH-185CH | Holiday 11 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 185DH-185FH | Holiday 12 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1860H-1862H | Holiday 13 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1863H-1865H | Holiday 14 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1866H-1868H | Holiday 15 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1869H-186BH | Holiday 16 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 186CH-186EH | Holiday 17 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 186FH-1871H | Holiday 18 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1872H-1874H | Holiday 19 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1875H-1877H | Holiday 20 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1878H-187AH | Holiday 21 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 187BH-187DH | Holiday 22 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 187EH-1880H | Holiday 23 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1881H-1883H | Holiday 24 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1884H-1886H | Holiday 25 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1887H-1889H | Holiday 26 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 188AH-188CH | Holiday 27 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 188DH-188FH | Holiday 28 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1890H-1892H | Holiday 29 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1893H-1895H | Holiday 30 Table (Month, Day, and The Number of TOU Schedule) | word | R/W |
| 1896H | The Tenth Year | word | R/W |
| 1897H | The Amount Number of Holidays in Tenth Year | word | R/W |

These setting are for daylight saving time. Function code: 03H for reading, 10H for writing.

Table 5-31 Daylight Saving Time Parameter Address Table

| Address | Parameter | Range | Data Type | Type of access |
|---------|---|--------------------------|-----------|----------------|
| 1100H | Enable DST | 1: Enable; 0: Disable | Word | R/W |
| 1101H | DST Format | 0: Format 1; 1: Format 2 | Word | R/W |
| Format1 | | | | |
| 1102H | DST Start Month | 1~12 | Word | R/W |
| 1103H | DST Start Day | 1~31 | Word | R/W |
| 1104H | DST Start House | 0~23 | Word | R/W |
| 1105H | DST Start Minute | 0~59 | Word | R/W |
| 1106H | Adjust Time of DST Start (Unit: Minute) | 1~120 | Word | R/W |
| 1107H | DST Ending Month | 1~12 | Word | R/W |
| 1108H | DST Ending Day | 1~31 | Word | R/W |
| 1109H | DST Ending House | 0~23 | Word | R/W |
| 110AH | DST Ending Minute | 0~59 | Word | R/W |
| 110BH | Adjust Time of DST Ending (Unit: Minute) | 1~120 | Word | R/W |
| Format2 | | | | |
| 110CH | DST Start Month | 1~12 | Word | R/W |
| 110DH | DST Start Day (Mon/Tue/Wed/Thu/Fri/Sat/ Sun) | 0: Sun; 1~6: Mon ~ Sat | Word | R/W |
| 110EH | DST Start Week | 1~5 | Word | R/W |
| 110FH | DST Start House | 0~23 | Word | R/W |
| 1110H | DST Start Minute | 0~59 | Word | R/W |
| 1111H | Adjust Time of DST Start (Unit: Minute) | 1~120 | Word | R/W |
| 1112H | DST Ending Month | 1~12 | Word | R/W |
| 1113H | DST Ending Day (Mon/Tue/Wed/Thu/Fri/Sat/ Sun) | 0: Sun; 1: 6: Mon ~ Sat | Word | R/W |
| 1114H | DST Ending Week | 1~5 | Word | R/W |
| 1115H | DST Ending House | 0~23 | Word | R/W |
| 1116H | DST Ending Minute | 0~59 | Word | R/W |
| 1117H | Adjust Time of DST Ending (Unit: Minute) | 1~120 | Word | R/W |

Extend I/O Setting Area

This includes the extended I/O communication parameters, DO related parameters, and DI related parameters. The DO parameters section includes pulse output and alarm output function options such as when set to pulse output functions, including pulse constant, pulse width and high level of output delay settings; When set to alarm output functions, including alarm delay, alarm conditions and alarm limits setting. The DI setting contains the DI function selection and pulse constant setting, the bit0-bit3 correspond to the DI1 to DI4 state in the 0x1900 address. If the value of bit0 is 1, it indicates the DI1 status is pulse counting state. If the value of bit0 is 0, it indicates the DI1 status is SOE state. Other bits function the same as bit0.

Table 5-32 Extend I/O Parameter Setting

| Address | Parameter | Range | Data Type | Type of access |
|---------|--|--|-----------|----------------|
| 1900H | DI Type | Bit0:DI1; Bit1:DI2; Bit2:DI3; Bit3:DI4(0: SOE; 1: Pulse Counter) | Word | R/W |
| 1901H | DI Pulse Constant | 1-65535 | Word | R/W |
| 1902H | Clear DI Counters | Only 0AH Work | Word | R/W |
| 1903H | Work Mode of Do1 | 0: Pulse Output; 1: Alarm On Channel 1; 2: Alarm On Channel 2; 3: Alarm On Channel 1 and Channel 2; 4: Communication Control | Word | R/W |
| 1904H | Work Mode of Do2 | 0: Pulse Output; 1: Alarm On Channel 1; 2: Alarm On Channel 2; 3: Alarm On Channel 1 and Channel 2; 4: Communication Control | Word | R/W |
| 1905H | Pulse Constant | 1~60000(How Much Pulse is 1Kwh) | Word | R/W |
| 1906H | Do Pulse Width | 20 ~ 3000ms | Word | R/W |
| 1907H | Do1 Energy Output | 0: NONE; 1: Ep_imp; 2: Ep_exp; 3: Eq_imp; 4: Eq_exp | Word | R/W |
| 1908H | Do2 Energy Output | 0: NONE; 1: Ep_imp; 2: Ep_exp; 3: Eq_imp; 4: Eq_exp | Word | R/W |
| 1909H | Alarm Delay Time | 0~255(300ms) | Word | R/W |
| 190AH | The Alarm Parameter of Channel 1 | 0~51 | Word | R/W |
| 190BH | The Alarm Mode of Channel 1 | 0 <; 1> | Word | R/W |
| 190CH | The Alarm Threshold of Channel 1 | 0~65535 | Word | R/W |
| 190DH | The Alarm Parameter of Channel 2 | 0~51 | Word | R/W |
| 190EH | The Alarm Mode of Channel 2 | 0 <; 1> | Word | R/W |
| 190FH | The Alarm Threshold of Channel 2 | 0~65535 | Word | R/W |
| 1910H | Alarm Backlight Flash | 0: Backlight Flash When Alarm Status; 1: Backlight Don't Flash When Alarm Status | Word | R/W |
| 1911H | Clear Alarm Record | Only 0AH Work | Word | R/W |
| 1912H | DO output model by communication control | 0x01: Level; 0x02: Pulse | Word | R/W |

| Address | Parameter | Range | Data Type | Type of access |
|---|-----------|-------|-----------|----------------|
| Alarm Parameter: | | | | |
| 0: Disable; 1: Frequency; 2: A-Phase Voltage ; 3: B-Phase Voltage ; 4: B-Phase Voltage; 5: Phase Voltage Average; 6: Line Voltage V12; 7: Line Voltage V23 ; 8: Line Voltage V31; 9: Line Voltage Average; 10: Phase (line) current I1; 11: Phase (line) current I2; 12: Phase (line) current I3; 13: Reversed; 14: Middle line current In; 15: Total Current; 16: Average Current; 17: Phase A power Pa; 18: Phase B power Pb; 19: Phase C power Pc; 20: System power Pcon; 21: Phase A reactive power Qa; 22: Phase B reactive power Qb; 23: Phase C reactive power Qc; 24: System reactive power Qcon; 25: Phase A Apparent power Sa; 26: Phase B Apparent power Sb; 27: Phase C Apparent power Sc; 28: System Apparent power Scon; 29: Phase A power factor PFa; 30: Phase B power factor PFb; 31: Phase C power factor PFC; 32: System power factor PFcon; 33: Voltage unbalance factor U_unbl; 34: Current unbalance factor I_unbl; 35: Power demand P_DEMA; 36: Reactive Power demand Q_DEMA; 37: Apparent power demand S_DEMA; 38: Phase A current demand Ia_DEMA; 39: Phase B current demand Ib_DEMA; 40: Phase C current demand Ic_DEMA; 41: Neutral line current demand IN_DEMA; 42: THD_V1; 43: THD_V2; 44: THD_V3; 45: THD_Voltage_Average; 46: THD_I1; 47: THD_I2; 48: THD_I3; 49: THD_IN; 50: THD_Current_Average; 51: Reverse Phase Sequence. | | | | |

The address area contains the pulse counter number. The pulse counter number could be reserved with power-down or cleared through PC software.

Table 5-33 Data Address of Pulse Accumulation

| Address | Parameter | Range | Data Type | Type of access |
|---|--------------------|--------------|-----------|----------------|
| DI parameter setting area 03H read; 10H write | | | | |
| 2160H-2161H | DI1 counter number | 0~4294967295 | Dword | R |
| 2162H-2163H | DI2 counter number | 0~4294967295 | Dword | R |
| 2164H-2165H | DI3 counter number | 0~4294967295 | Dword | R |
| 2166H-2167H | DI4 counter number | 0~4294967295 | Dword | R |

It contains 20 SOE events during 0x3200 and 0x3262 address area, it indicates 1st SOE event address area from 0x3200 to 0x4204, the format as: year-month, day hour, minute-second, millisecond, and DI state. The other's format is same as first event.

Table 5-34 SOE Event Parameter Address Area

| Address | Parameter | Range | Data Type | Type of access |
|---------------------------------|---|---------------|-----------|----------------|
| SOE Time recording area03H read | | | | |
| 3200H | Time Stamp-Year (SOE Record 1) (High) | 00~99 | word | R |
| | Time Stamp-Month (SOE Record 1) (Low) | 1~12 | | R |
| 3201H | Time Stamp-Day (SOE Record 1) (High) | 1~31 | word | R |
| | Time Stamp-Hours (SOE Record 1) (Low) | 0~23 | | R |
| 3202H | Time Stamp-Minute (SOE Record 1) (High) | 0~59 | word | R |
| | Time Stamp-Second (SOE Record 1) (Low) | 0~59 | | R |
| 3203H | Time Stamp-millisecond (SOE Record 1) | 0~999 | word | R |
| 3204H | IO block of SOE Record 1 | 0~15 | word | R |
| 3205H-3209H | SOE Record 2 | Same As Above | word | R |
| 320AH-320EH | SOE Record 3 | Same As Above | word | R |
| 320FH-3213H | SOE Record 4 | Same As Above | word | R |
| 3214H-3218H | SOE Record 5 | Same As Above | word | R |
| 3219H-321DH | SOE Record 6 | Same As Above | word | R |
| 321EH-3222H | SOE Record 7 | Same As Above | word | R |

| Address | Parameter | Range | Data Type | Type of access |
|-------------|---------------|---------------|-----------|----------------|
| 3223H-3227H | SOE Record 8 | Same As Above | word | R |
| 3228H-322CH | SOE Record 9 | Same As Above | word | R |
| 322DH-3231H | SOE Record 10 | Same As Above | word | R |
| 3232H-3236H | SOE Record 11 | Same As Above | word | R |
| 3237H-323BH | SOE Record 12 | Same As Above | word | R |
| 323CH-3240H | SOE Record 13 | Same As Above | word | R |
| 3241H-3245H | SOE Record 14 | Same As Above | word | R |
| 3246H-324AH | SOE Record 15 | Same As Above | word | R |
| 324BH-324FH | SOE Record 16 | Same As Above | word | R |
| 3250H-3254H | SOE Record 17 | Same As Above | word | R |
| 3255H-3259H | SOE Record 18 | Same As Above | word | R |
| 325AH-325EH | SOE Record 19 | Same As Above | word | R |
| 325FH-3263H | SOE Record 20 | Same As Above | word | R |

The address area for the SOE single event reading, through continuous reading of the address area of a single SOE record, achieving the current single SOE records continuously updated to meet the SOE event to read all 20 goals. One address 0x406H, the type of access is read and write, it can achieve the specified single event reading by writing the location of a single SOE records to the address.

Table 5-35 Single SOE Event Parameter Address Area

| Address | Parameter | Range | Data Type | Type of access |
|--|---|-------|-----------|----------------|
| SOE single event recording area: 03H read; 10H Write | | | | |
| 32C0H | Time Stamp-Year (SOE Record 1) (High) | 00~99 | word | R |
| | Time Stamp-Month (SOE Record 1) (Low) | 1~12 | | |
| 32C1H | Time Stamp-Day (SOE Record 1) (High) | 1~31 | word | R |
| | Time Stamp-Hours (SOE Record 1) (Low) | 0~23 | | |
| 32C2H | Time Stamp-Minute (SOE Record 1) (High) | 0~59 | word | R |
| | Time Stamp-Second (SOE Record 1) (Low) | 0~59 | | |
| 32C3H | Time Stamp-millisecond (SOE Record 1) | 0~999 | word | R |
| 32C4H | IO block of SOE Record 1 | 0~15 | word | R |
| 32C5H | The Last SOE Record Number | 0~20 | word | R |
| 32C6H | The Number of SOE Records | 0~20 | word | R/W |

Digital Output State

The user can monitor DO state by reading the address area. The function code is 01H.

Table 5-36 DO State Reading Area

| Address | Parameter | Range | Data Type |
|---|-----------|---------------|-----------|
| Function Code:01H for Reading, 05 for Writing | | | |
| 0000H | DO1 | 1: ON; 0: OFF | bit |
| 0001H | DO2 | 1: ON; 0: OFF | bit |

Digital Input State

The user can monitor DI state by reading the address area. The function code is 02H.

Table 5-37 DI State Reading Area

| Address | Parameter | Range | Data Type |
|-------------------------------|-----------|---------------|-----------|
| Function Code:02H for Reading | | | |
| 0000H | DI1 | 1: ON; 0: OFF | bit |
| 0001H | DI2 | 1: ON; 0: OFF | bit |
| 0002H | DI3 | 1: ON; 0: OFF | bit |
| 0003H | DI4 | 1: ON; 0: OFF | bit |

Some explanations:

1. The data type: "Word" refers to 16-bit unsigned integer; "Integer" means a 16-bit signed integer; "Dword" refers to 32-bit unsigned integer; Float refers to the 32-bit floating-point numbers; ban would be inconsistent with the value range of data write.
2. Type of access: "R" read-only, read the instrument parameters with the command number 03H; "R/W" read and write; write command system parameter No. 10H. Prohibits not listed or non-writable attribute address to write to.
3. The measured parameters (address 2000H~2030H) Make sure to read relational data types, value range and the communication value and the actual value.
4. Electrical power and instrumentation running time of 32-bit unsigned integer, the upper and lower half and an address. Host software should be high numerical value obtained by multiplying the low energy electrical and instrumentation run- time results on 65536 plus. Electric energy meter and total running time to 1×10^9 will automatically be cleared, re-accumulated. Electrical energy is writable, it can be cleared or preset communication; meter run time cannot write but can be cleared.

Appendix

Appendix A: Technical Data and Specification

| Current Inputs (Each Channel) | |
|-------------------------------|---|
| Nominal Current | ① 5A, ② 1A, ③ 1A(333mV), ④ 1A (100mV Rope- CT), ⑤ 1A(80mA/100mA/200mA), ⑥ 1A (6.68mA) |
| Metering Range | ① 0~10A, ② 0~2A, ③ 0~1.2A, ④ 0~1.2A,...⑤ 0~1.2A, ⑥ 0 ~ 1.2A |
| Pickup Current | ① 5mA, ② 1mA, ③ 5mA, ④ 5mA, ⑤ 5mA, ⑥ 5mA |
| Withstand | 20Arms continuous 100Arms for 1 second, non-recurring |
| Burden | 0.05VA (typical) @ 5Arms |
| Accuracy | 0.2% |
| Energy Accuracy | |
| Active | Class 0.5s (According to IEC 62053-22) Class 0.5 (According to ANSI C12.20) |
| Reactive | Class 2 (According to IEC 62053-23) |
| Harmonic Resolution | |
| Metered Value | 2nd~63rd harmonics |

| Voltage Inputs (Each Channel) | |
|-------------------------------|---|
| Nominal Full Scale | 400Vac L-N, 690Vac L-L (+20%) |
| Withstand | 1500Vac continuous 2500Vac, 50/60Hz for 1 minute |
| Input Impedance | 2Mohm per phase |
| Metering Frequency | 45Hz~65Hz |
| Pickup Voltage | 10Vac |
| Accuracy | 0.2% |

| Control Power | |
|---|---------------------------------|
| AC/DC Control Power | |
| Operating Range | 100~415Vac, 50/60Hz, 100~300Vdc |
| Burden | 3W |
| Withstand | 3250Vac, 50/60Hz for 1 minute |
| Low Voltage DC Control Power (Optional) | |
| Operating Range | 20~60Vdc |
| Burden | 3W |

Accuracy

| Metering | | | |
|-----------------------|----------|------------|-------------------|
| Parameters | Accuracy | Resolution | Range |
| Voltage | 0.2% | 0.1V | 20V~1000kV |
| Current | 0.2% | 0.001A | 0~50000A |
| Current Demand | 0.2% | 0.001A | 0~50000A |
| Power | 0.5% | 1W | -9999~9999MW |
| Reactive Power | 0.5% | 1var | -9999~9999Mvar |
| Apparent Power | 0.5% | 1VA | 0~9999MVA |
| Power Demand | 0.5% | 1W | -9999~9999MW |
| Reactive Power Demand | 0.5% | 1var | -9999~9999Mvar |
| Apparent Power Demand | 0.5% | 1VA | 0~9999MVA |
| Power Factor | 0.5% | 0.001 | -1.0~1.0 |
| Frequency | 0.05% | 0.01Hz | 45.00~65.00Hz |
| Energy | 0.5% | 0.1kWh | 0~99999999.9kWh |
| Reactive Energy | 0.5% | 0.1kvarh | 0~99999999.9kvarh |
| Apparent Energy | 0.5% | 0.1VAh | 0~99999999.9kVAh |
| Harmonics | 1.0% | 0.01% | |
| Meter Running Time | | 0.1hrs | 0~99999999.9hrs |
| Load Running Time | | 0.1hrs | 0~99999999.9hrs |

| Standards | |
|---------------|---|
| Measuring | IEC 61036 Class 1, ANSI C12.16 Class 10 |
| Environmental | IEC 60068-2 |
| Safety | IEC 61010-1, UL 61010-1 |
| EMC | IEC 61000-4/2-3-4-5-6-8-11 |
| Dimensions | DIN 43700/ANSI C39.1 |

| Digital input (DI) | |
|-----------------------|-----------------------|
| Input Type | Dry Contact |
| Input Resistance | 4kΩ |
| Pulse Frequency (Max) | 100Hz, 50% Duty Ratio |
| SOE Resolution | 2ms |

| Digital output (DO)(Photo-MOS) | |
|--------------------------------|----------------------|
| Voltage Range | 0~250Vac/dc |
| Load Current | 100mA (Max) |
| Output Frequency (Max) | 25Hz, 50% Duty Ratio |
| Isolation Voltage | 2500V |

| Relay Output (RO) | |
|--------------------------|---------------------|
| Switching Voltage (Max) | 250Vac, 30Vdc |
| Load Current | 5A(R), 2A(L) |
| Set Time | 10ms (Max) |
| Contact Resistance | 30mΩ (Max) |
| Isolation Voltage | 2500Vac |
| Mechanical Life | 1.5x10 ⁷ |

| Communication port | |
|---|--|
| RS-485 (Optional) Modbus [®] -RTU Protocol 2-wire connection, Half-duplex, Isolated 1200 to 38400 baud rate Second RS485 (option for Acuvim-CL, Acuvim-EL) | |
| PROFIBUS (Optional) PROFIBUS-DP/V0 Protocol Works as PROFIBUS slave, baud rate adaptive, up to 12M Typical input bytes: 32, Typical output bytes: 32 PROFIBUS standard according to EN 50170 vol.2 | |
| L-WEB (Ethernet RJ45) (Optional) Protocol: Modbus-TCP/IP, DNP3.0 over IP V2, BACnet-IP, SNMP V3, HTTP/HTTPS post, FTP post, SMTP, NTP, HTTPs webserver; 4GB Datalogging memory | |

| Suitable condition | |
|---------------------------|---------------------------------|
| Operating temp. range | -25°C to 70°C -13°F to 158°F |
| Storage temp. range | -40°C to 85°C -40°F to 176°F |
| Humidity | 5%~95%, non-condensing |

Appendix B: Ordering Information

ORDERING INFORMATION

| + Meter Model | - Mounting Option | - Current Input | - Power Supply |
|--|---|--|--|
| Acuvim-BL: Basic Model + DO | D: Standard with LCD Display | 5A: 5A/1A (Input Field Selectable) | P1V3: 100~415Vac, 50~60Hz 100~300Vdc |
| Acuvim-CL: Basic Model + Communication + Extension | M: DIN Rail Mount (Optional Remote Display to be added) | RCT*: AcuCT-Flex Input | P2V3: 20~60Vdc |
| Acuvim-EL: Sharing Power + Communication + Extension | | 333: 333mV Input | |

Ordering Example: Acuvim-CL-D-RCT-P2V3

*Meters with RCT Current Input do not support I4, WIRING CHECK, POWER QUALITY, SEQUENCE, PHASE ANGLES, or POWER QUALITY EVENT LOGGING functions.

| + I/O Module (Optional) | - Logic Module | + Accessories (Optional) |
|--------------------------|---|--|
| L | WEB: Protocol: Modbus-TCP/IP, DNP 3.0 Over IP V2, BACnet-IP, SNMP V3, HTTP/HTTPs post, FTP post, SMTP, NTP, HTTPs webserver; 4GB Datalogging | REM-DS1V3: Remote Display (Compatible with Acuvim-L Series "M" (DIN Mount) models only) |
| | | AXM-DIN: DIN Rail Adapter |
| | | 96-IP66: Screen Protector for 96*96 meters |
| | | USB-RS485: USB-to-RS485 Converter |
| | | Ordering Example: AXM-DIN |
| Ordering Example: | L-WEB | |
| L | X1: 4DI+2DO | |
| | X2: 4DI+2DO+Second RS485 | |
| | X3: PROFIBUS | |
| | X4: 4DI+2DO+PROFIBUS | |
| | X5: 4DI+2RO | |
| | X6: 4DI+2RO+Second RS485 | |
| Ordering Example: | L-X4 | |

Notes:

1. Only the Acuvim-EL supports the use of expansion modules.
2. X4 and X6 two modules, respectively, by X1 + X3 and X1 and X5 composition and X3/X5 communication module shall be installed close to the body

Appendix C: Revision History

| Revision | Date | Description |
|----------|----------|---|
| 1.0 | 20070915 | First version |
| 1.1 | 20070930 | Add primary data address table of Basic measurements data and Statistics measurements data. |
| 1.2 | 20071109 | Add Apparent energy function. |
| 1.3 | 20090430 | Add single phase apparent power, apparent power demand and the max of apparent power demand; Update the ordering information. |
| 1.31 | 20090515 | Add TOU function |
| 1.40 | 20091023 | |
| 1.41 | 20100401 | Add TOU energy Display, TOU maximum demand and Holiday auto-switch. |
| 1.42 | 20101031 | Revise the content |
| 1.43 | 20110430 | Updated appendix part of data |
| 1.44 | 20110530 | DI type modified from wet contact to dry connect; add contents of PROFIBUS module. |
| 1.45 | 20120725 | Update the method for generating CRC value. |
| 3.01 | 20160612 | A comprehensive upgrade hardware and software |
| 3.02 | 20160902 | Add daily energy |
| 3.03 | 20170117 | Add Relay Output |
| 3.04 | 20211201 | Content revisions |



Accuenergy Inc.

Los Angeles - Toronto - Pretoria

North America Toll Free: 1-877-721-8908

Web: www.accuenergy.com

Email: marketing@accuenergy.com

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