

Acuvim-L Multifunction Power and Energy Meter

User's Manual



ACCUENERGY

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

Please read this manual carefully before installation, operation, and maintenance of 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:** **a. Quick Setup Guide,** **b. Calibration Certificate**	**qty: 2**

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 51mm 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, Iavg, 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, SNTP			
	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.

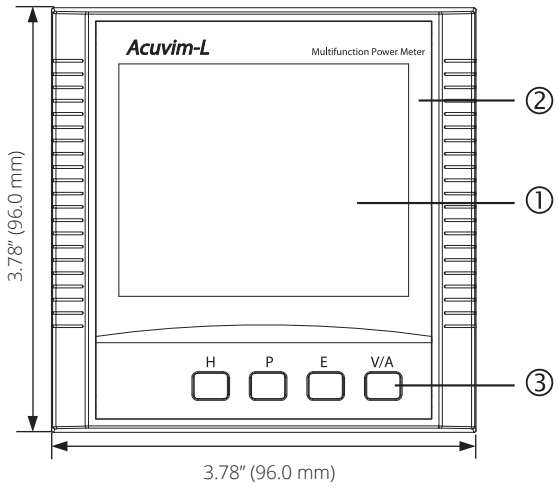
NOTE: THERE IS NO REQUIRED PREVENTIVE MAINTENANCE OR INSPECTION NECESSARY FOR SAFETY. HOWEVER, ANY REPAIR OR MAINTENANCE SHOULD BE PERFORMED BY THE FACTORY.

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

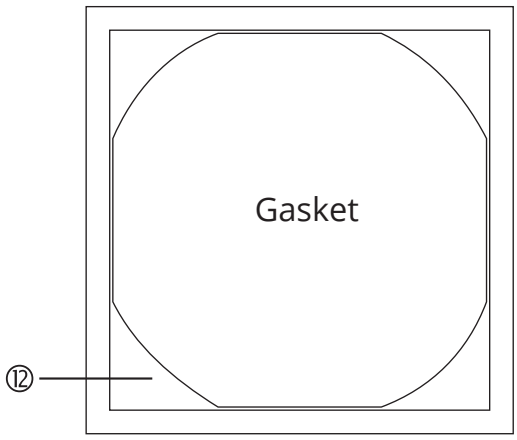
A Switch Or Circuit-Breaker Shall Be Included In The Installation. The Switch Shall Be In Close Proximity To The Equipment And Within Easy Reach Of The Operator. The Switch Shall Be Marked As The Disconnecting Device For The Equipment.

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

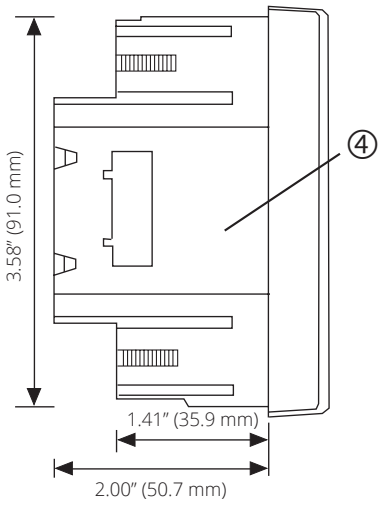
2.1 Appearance and Dimensions



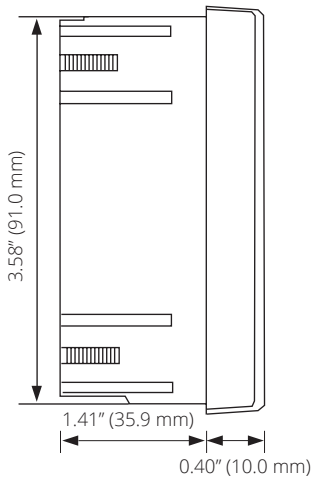
Front View of the Display Meter and Remote Display Unit



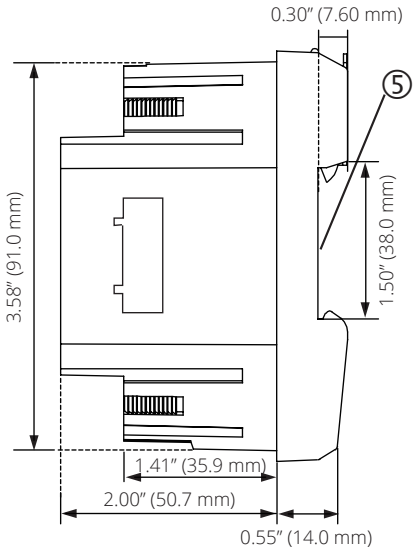
Gasket



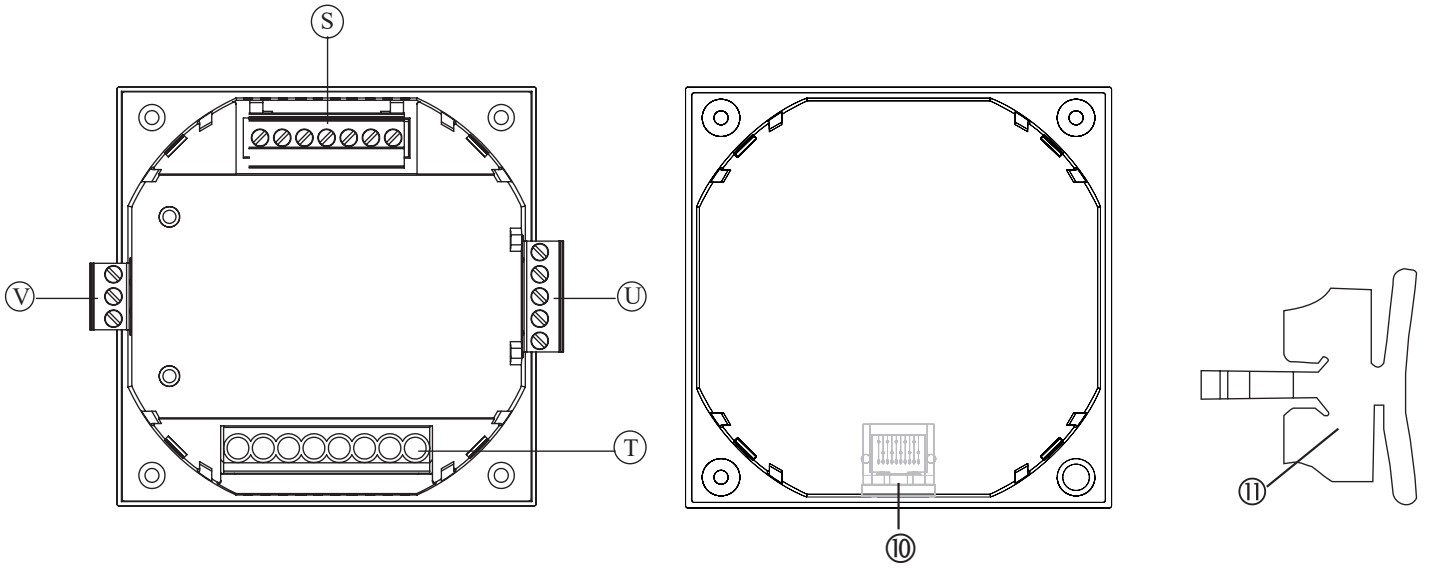
Side View of the Display Meter



Side View of the Remote Display Unit



Side View of the DIN rail Meter



Rear View

Rear View of the Remote Display Unit

Installation Clip

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:

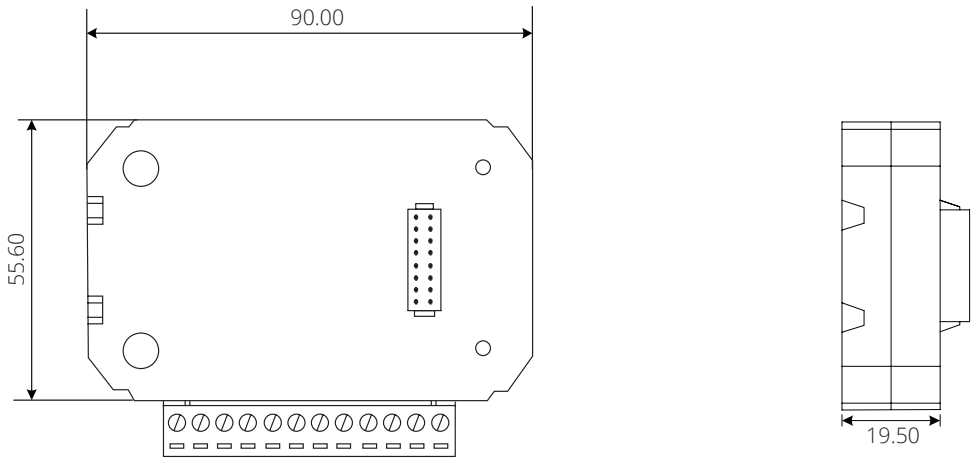


Fig 2-2 Structure Configuration of I/O Modules

PROFIBUS module appearance and mechanical dimensions:

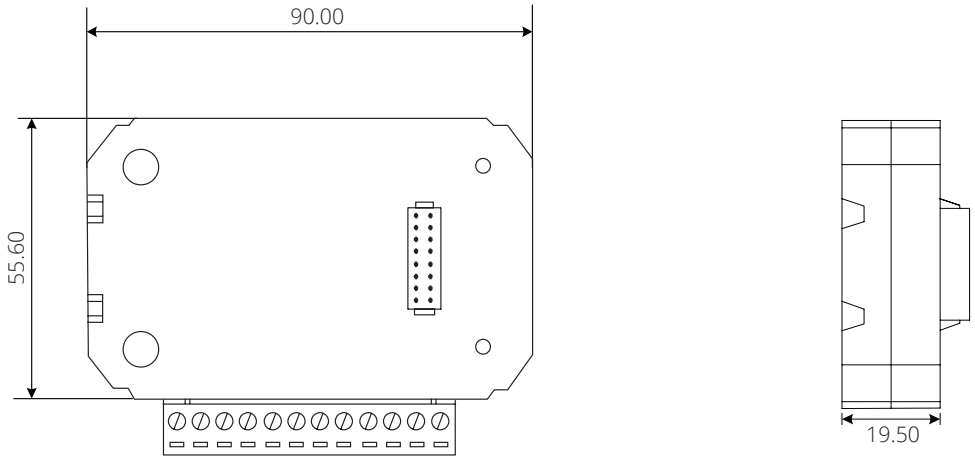


Fig 2-3 Structure Configuration of PROFIBUS Modules

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.

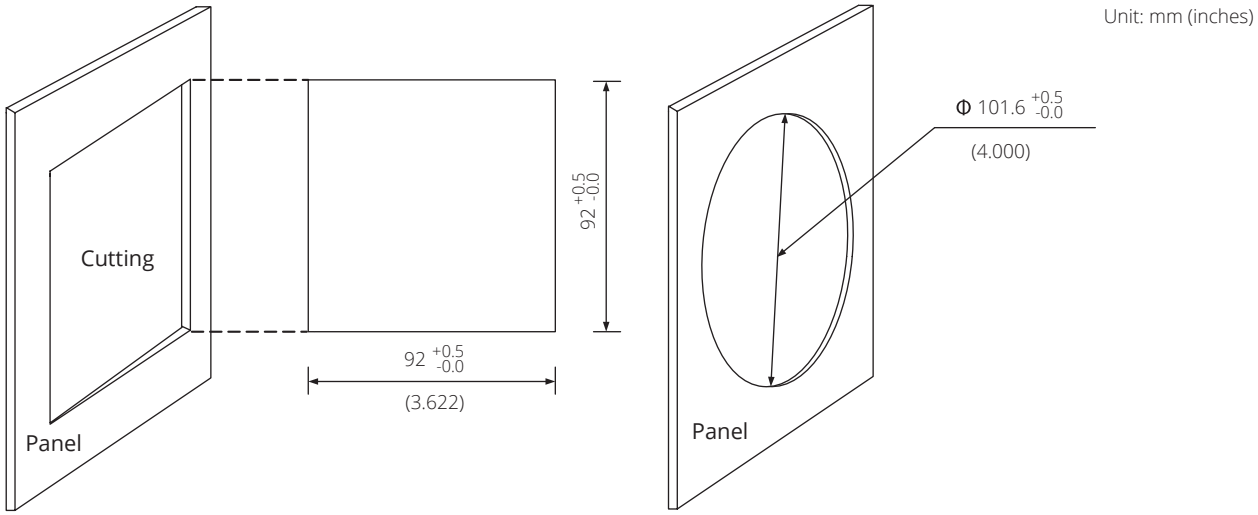


Fig 2-4 Panel Cutting

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

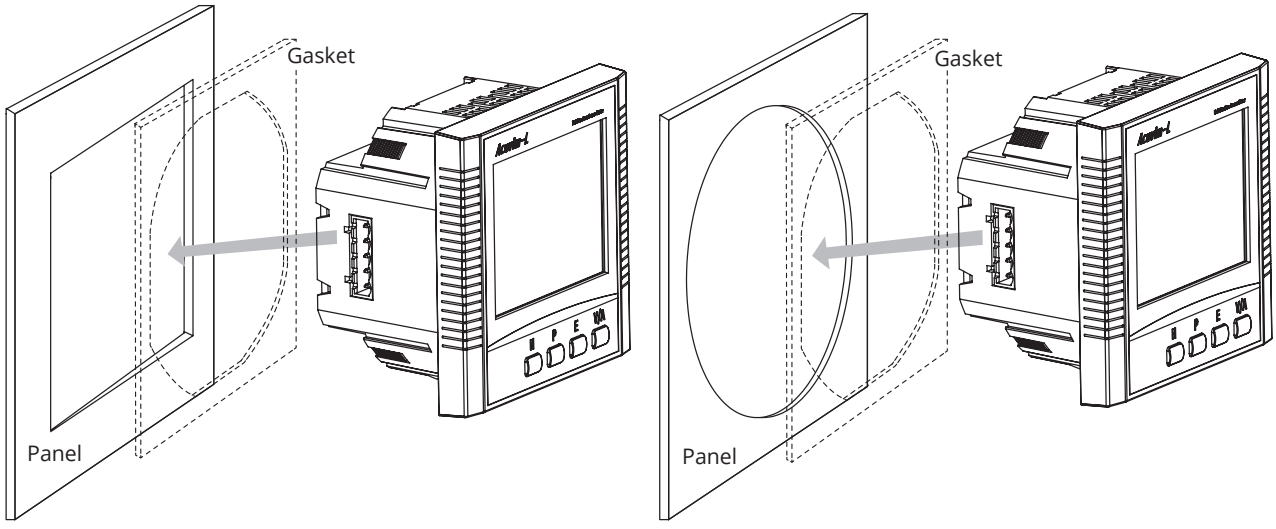


Fig 2-5 Put the Meter into the Square

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

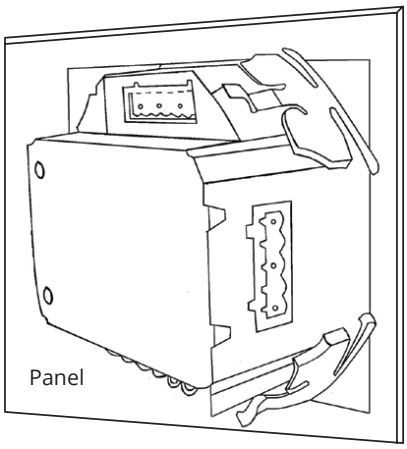


Fig 2-6 Use Clips to Fix the Meter

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.

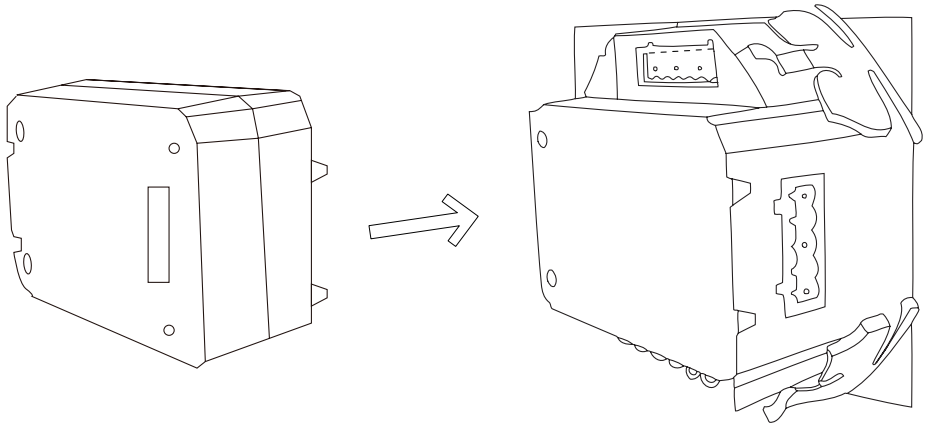


Fig 2-7 I/O Installation Diagram

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.

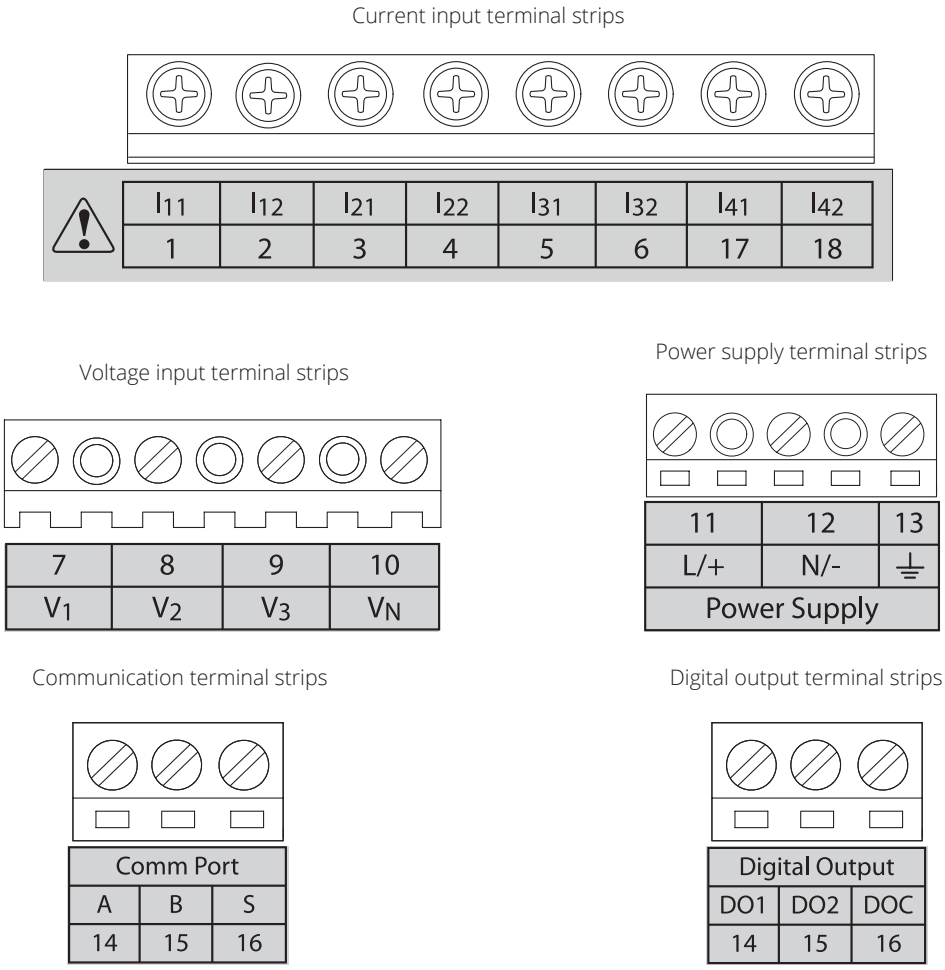


Fig 2-8 Terminal Diagram of Acuvim-L

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

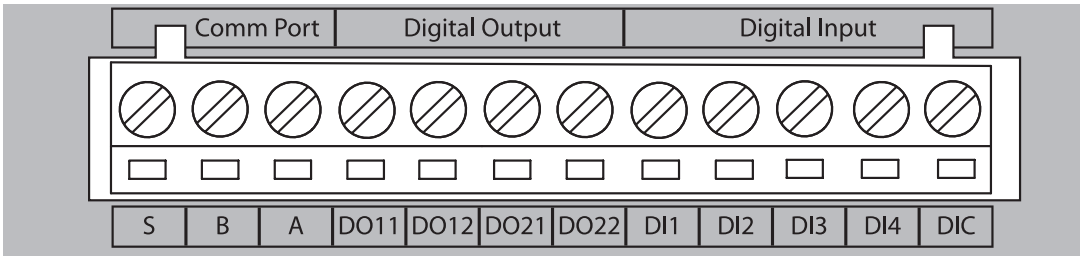


Fig 2-9 Expansion Module Terminal Description

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 uninterrupted 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.

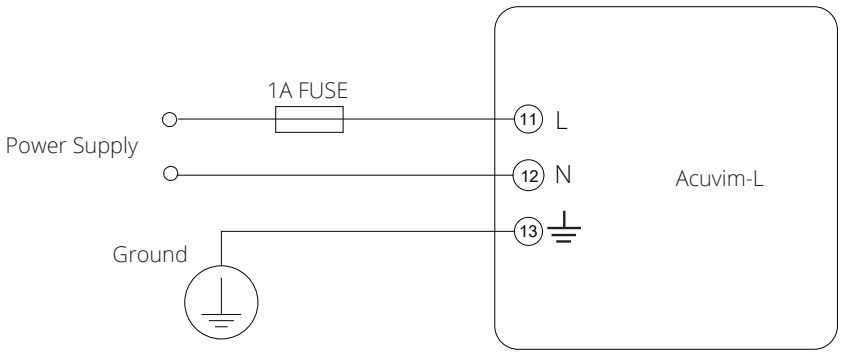


Fig 2-11 Wiring Connection of Power Supply

The wire of power supply should be AWG16~22 or 0.6~1.5mm^2.

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.

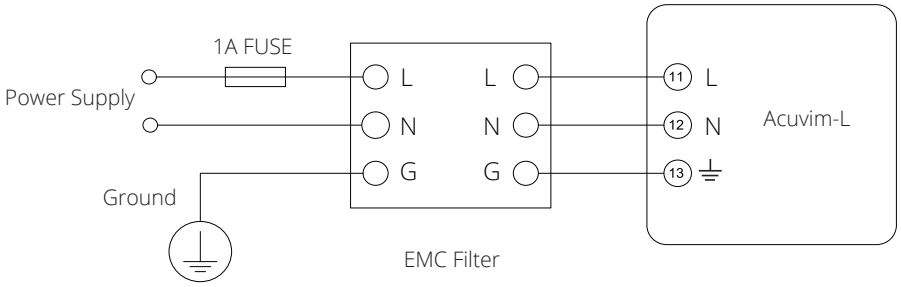


Fig 2-12 Wiring Connection of Auxiliary Power Supply with EMC Filters

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 0.6~1.5mm^2.

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 1.5~2.5mm^2.

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.

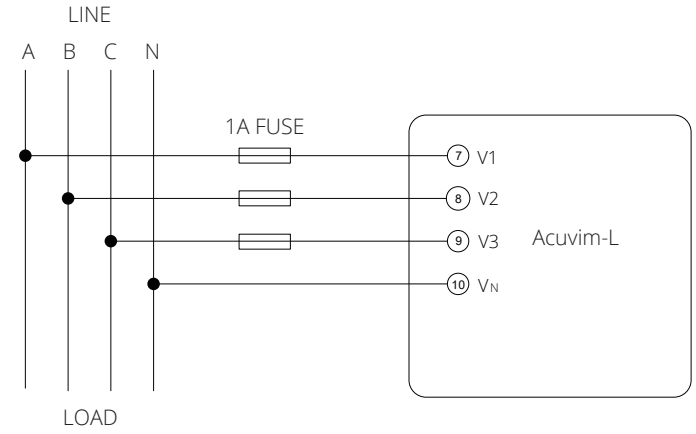


Fig 2-13 3LN Direct Connection

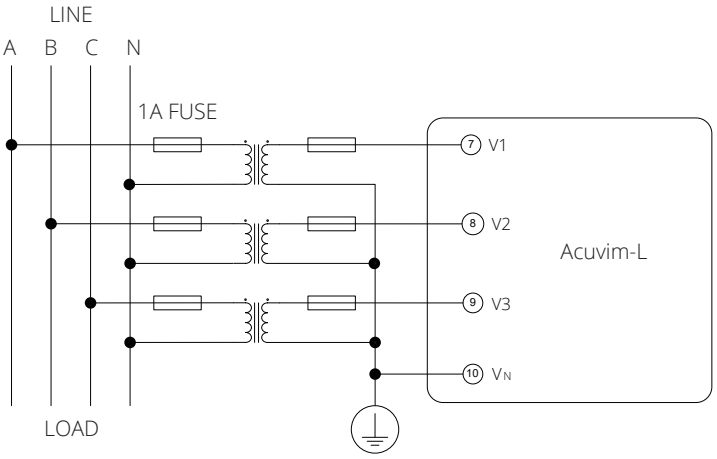


Fig 2-14 3LN Connection with 3PTs

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.

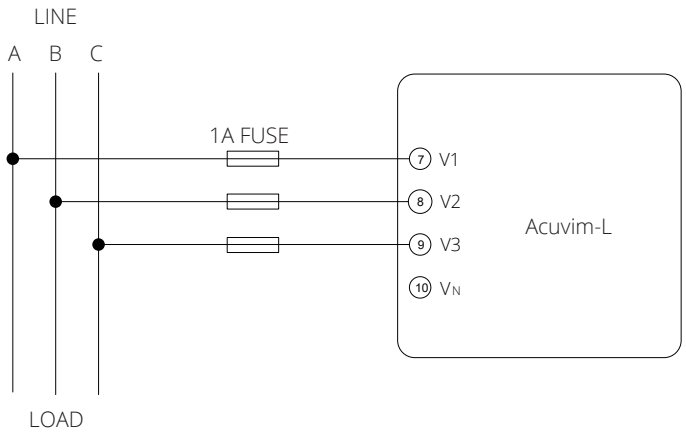


Fig 2-15 3LL 3-Phase 3-Line Direct Connection

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.

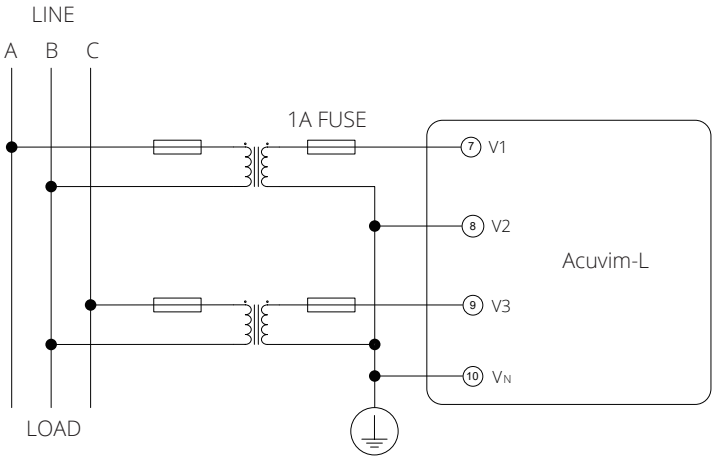


Fig 2-16 2LL with 2PTs

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.

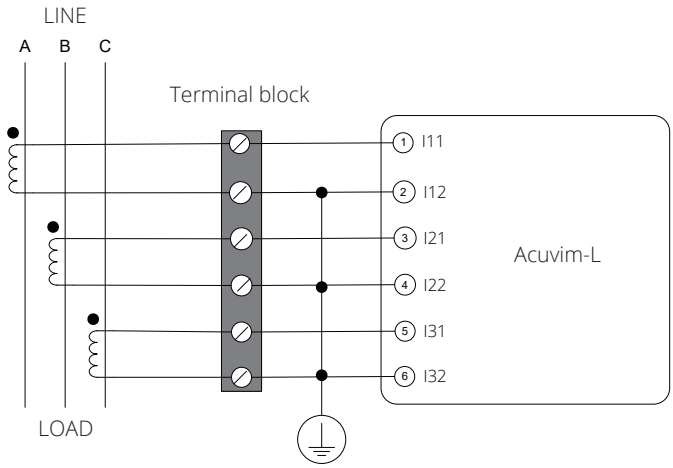


Fig 2-17 3CT

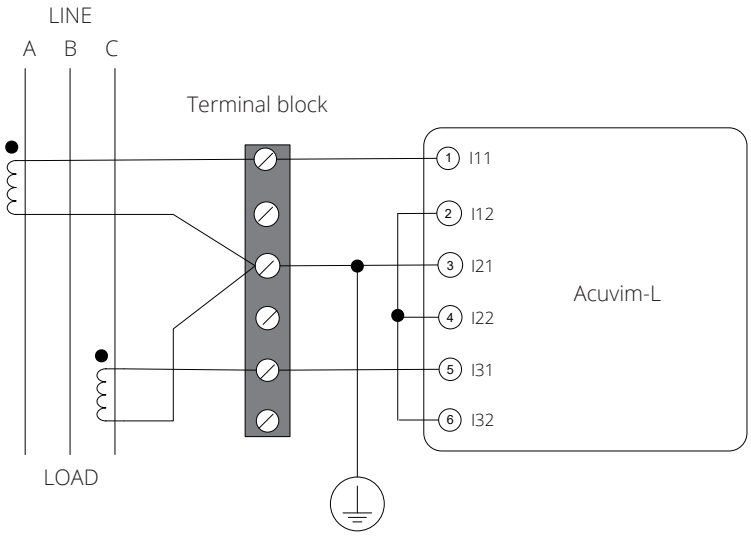


Fig 2-18 3CT

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 i1+i2+i3=0. The current input mode of the meter should be set to 2 CT.

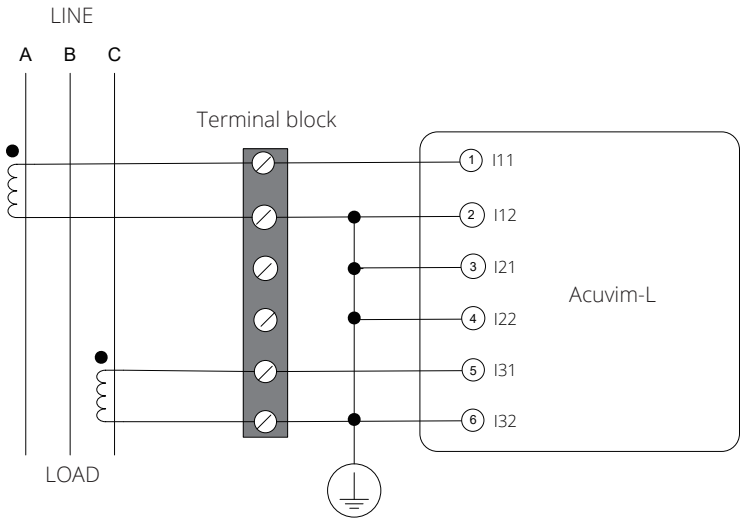


Fig 2-19 2CT

1CT

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

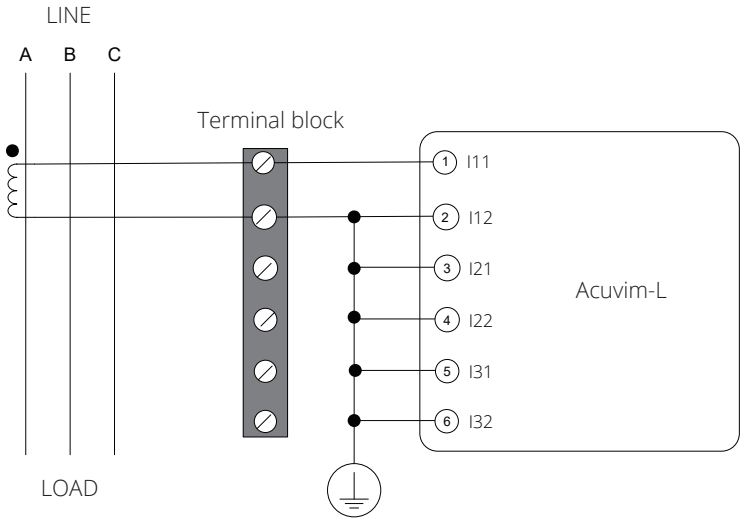


Fig 2-20 1CT

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)

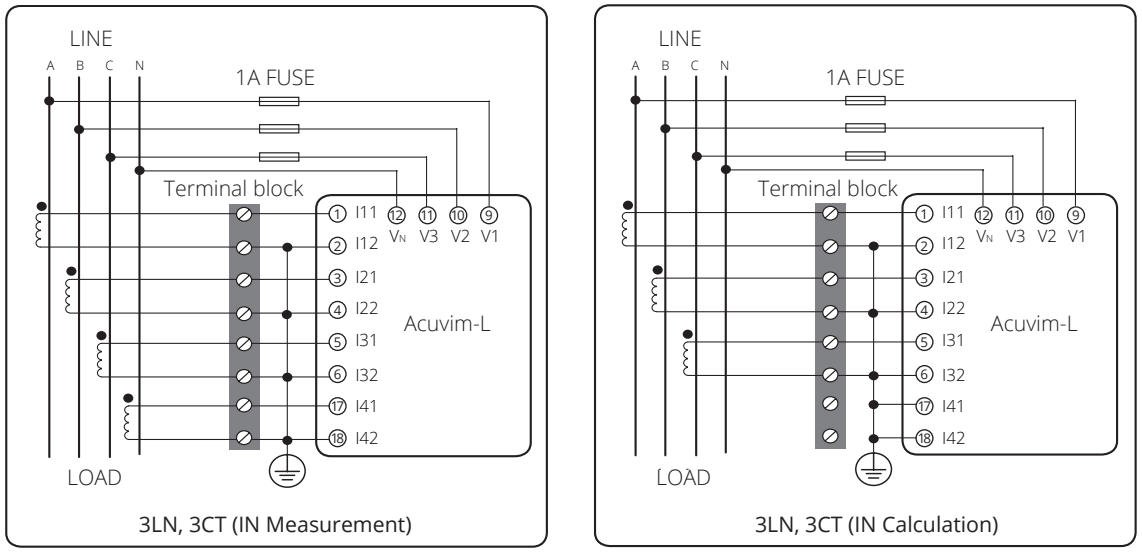


Fig 2-21 3LN, 3CT with 3CTs

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

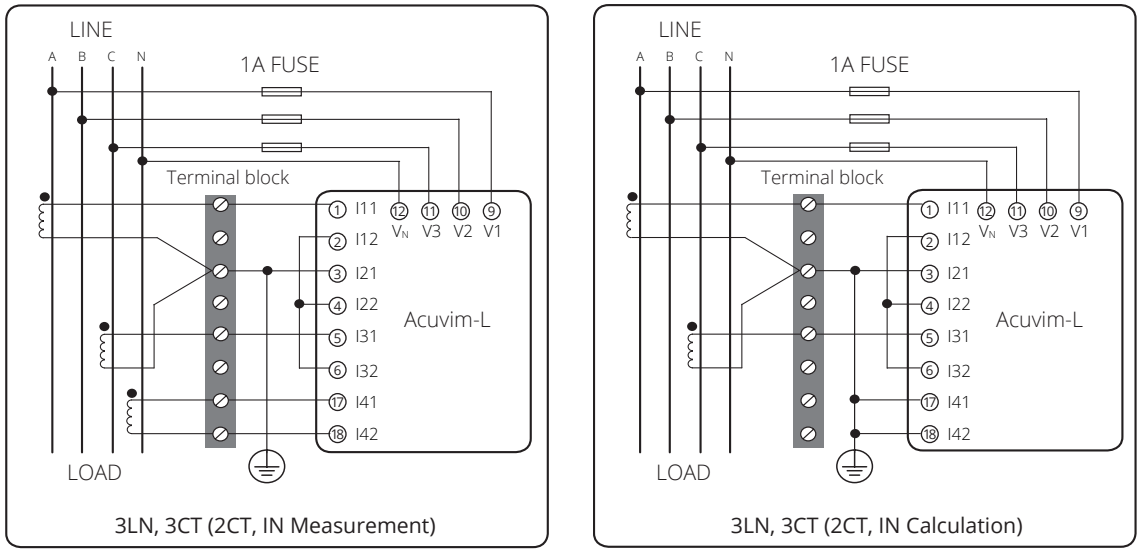


Fig 2-22 3LN, 3CT with 2CTs

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

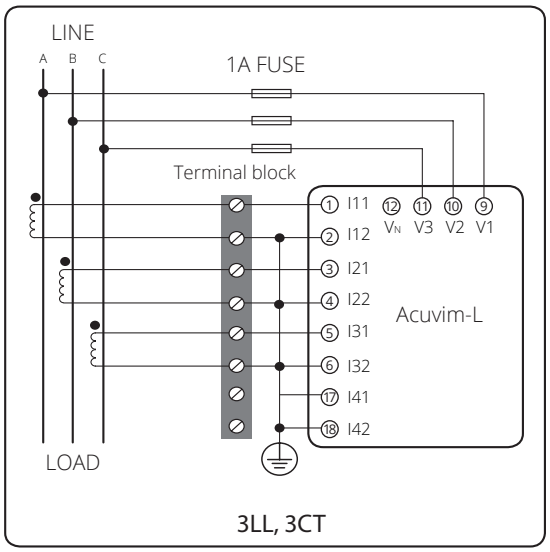


Fig 2-23 3LL, 3CT

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

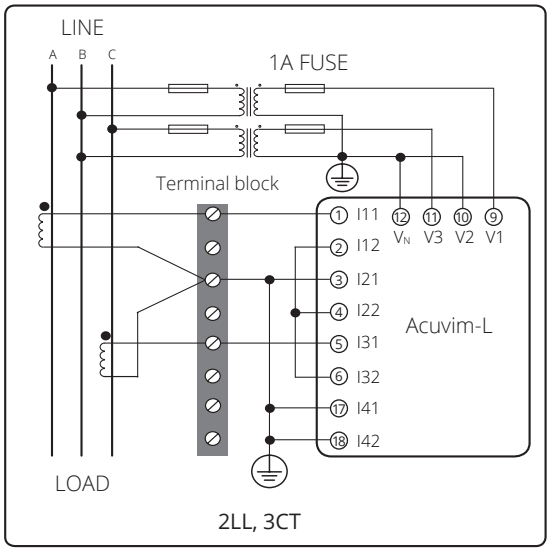


Fig 2-24 2LL, 3CT

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

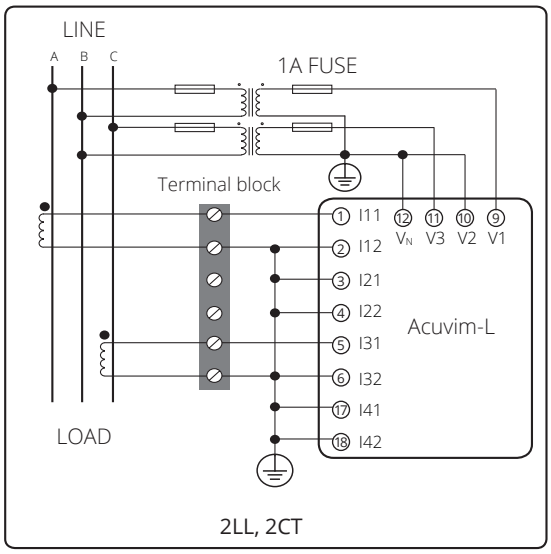


Fig 2-25 2LL, 2CT

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

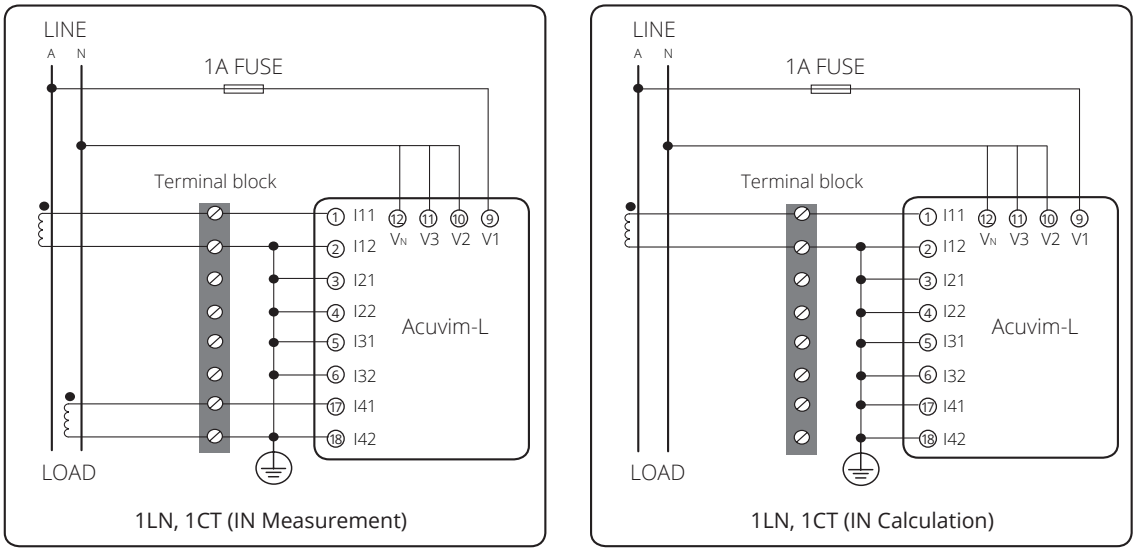


Fig 2-26 1LN, 1CT

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

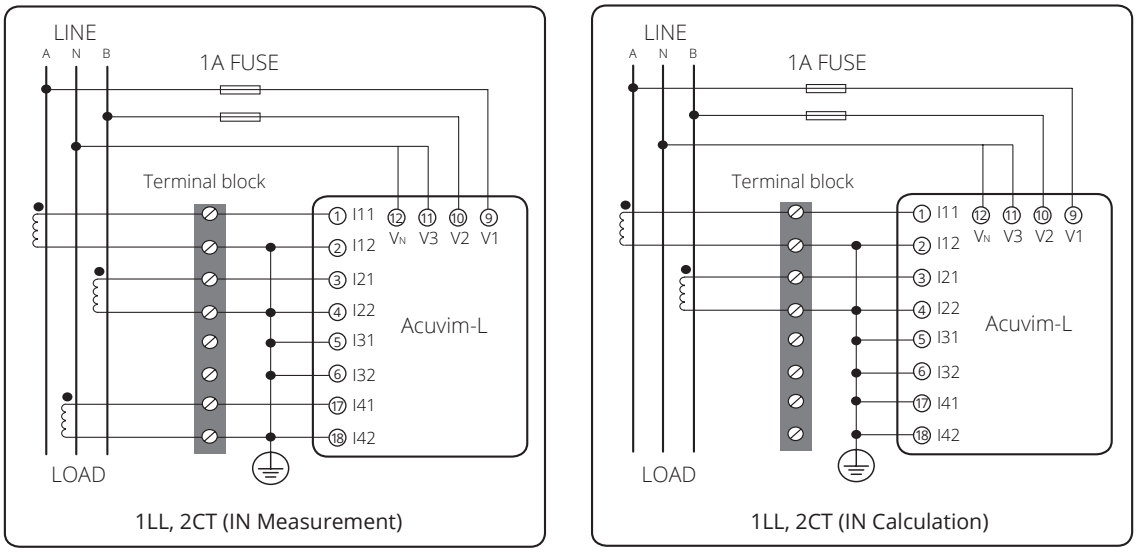


Fig 2-27 1LL, 2CT

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:

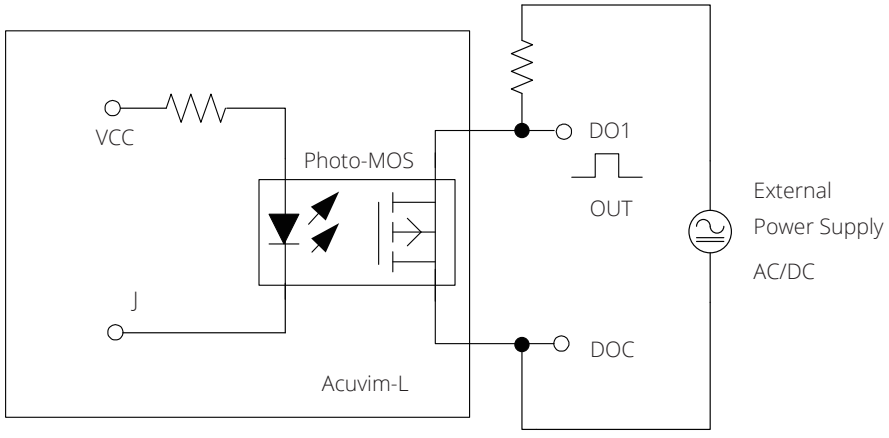


Fig 2-28 Digital Output Circuit

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 Acuview 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.

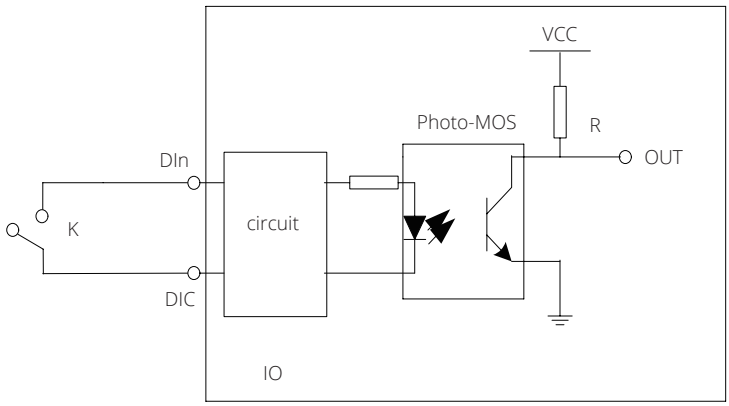


Fig 2-29 DI Input Circuit Diagram

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 0.5~1.3mm^2.

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.

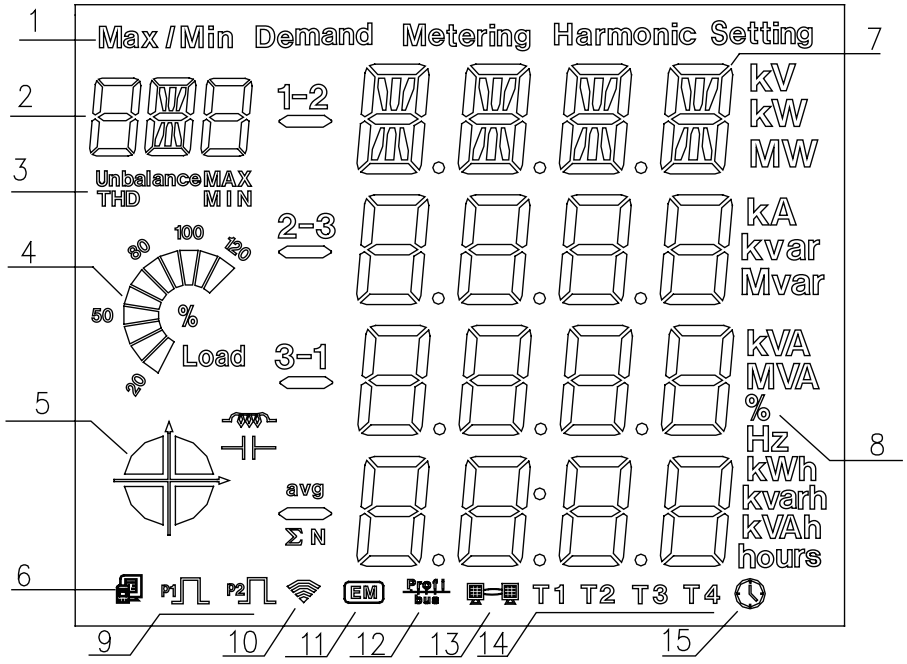


Fig 3-1 All Display Segments

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.

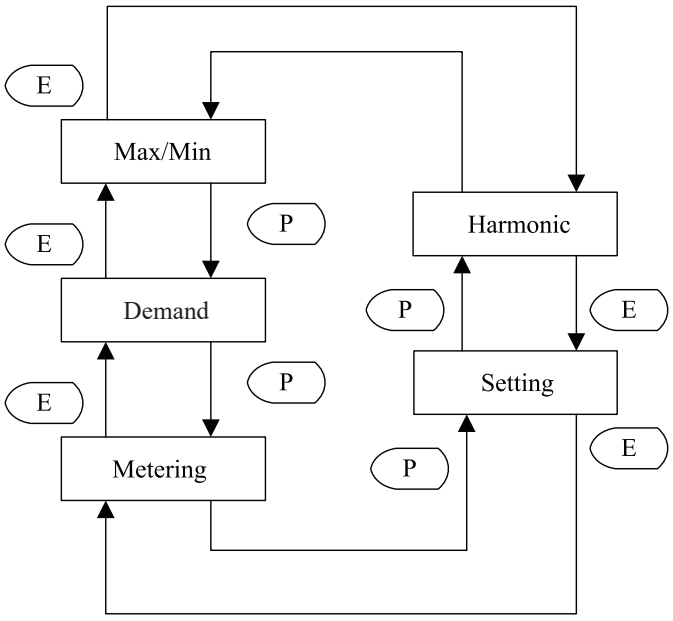


Fig 3-2 Operation Mode Selection Flow Chart

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 TOU energy (Accumulated)	Total	Active Energy	Import active energy	In this module, press the V/A key to switch to TOU demand interface.
			Export active energy	
			Active total energy	
			Active net energy	
		Reactive Energy	Inductive reactive energy	
			Capacitive reactive energy	
			Reactive total energy	
			Reactive net energy	
		Apparent Energy	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 sharing time energy (Accumulated)	Page structure of power sharing with the previous month			
Current month TOU energy (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:

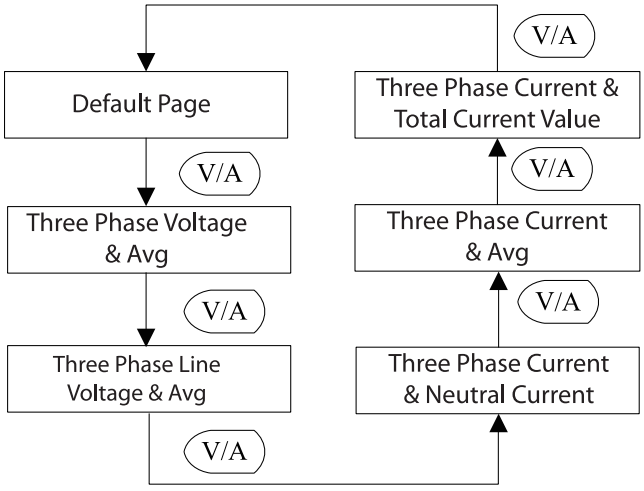


Fig 3-3 Voltage and Current Display Module Key Operation

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:

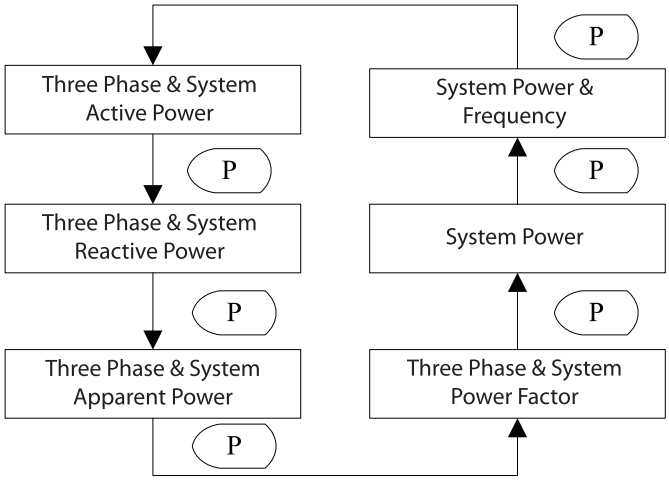


Fig 3-4 Power Module Key Operation Flowchart

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:

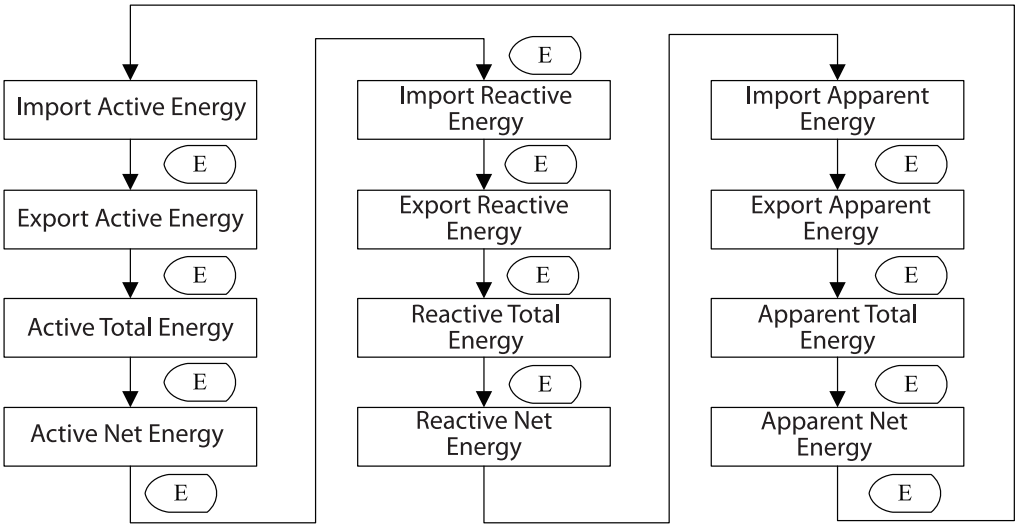


Fig 3-5 Energy Display Key Operation Flowchart

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:

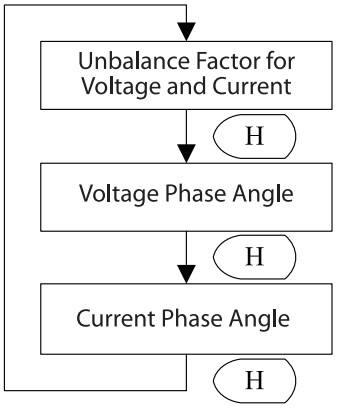


Fig 3-6 Unbalance Key Operation

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.

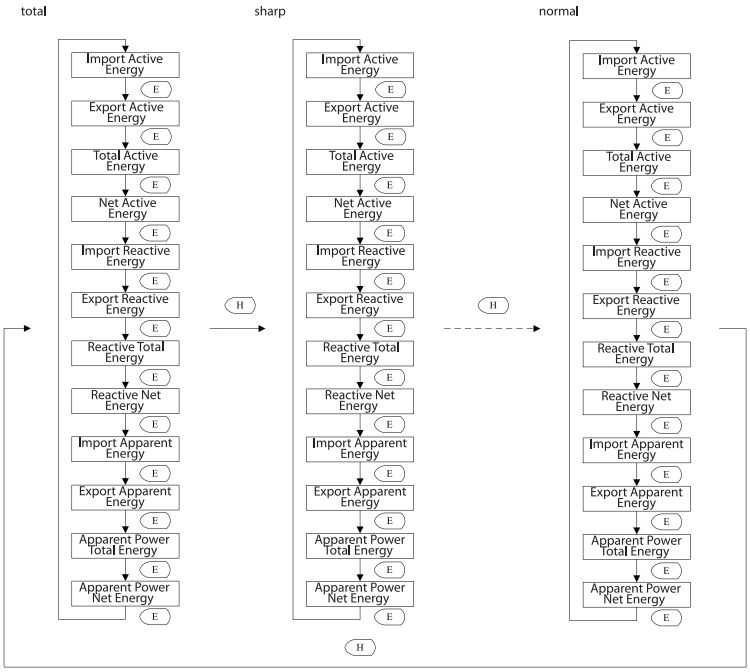


Fig 3-7 The Operation of TOU Energy

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:

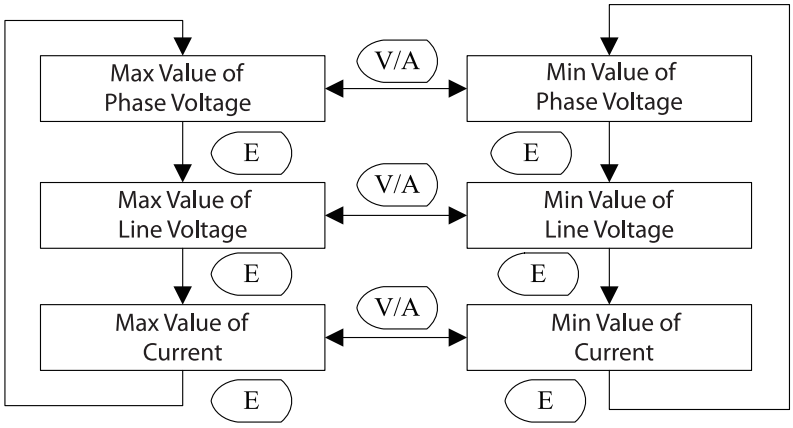


Fig 3-8 Voltage/Current the Most Value Keys Operation Flowchart

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:

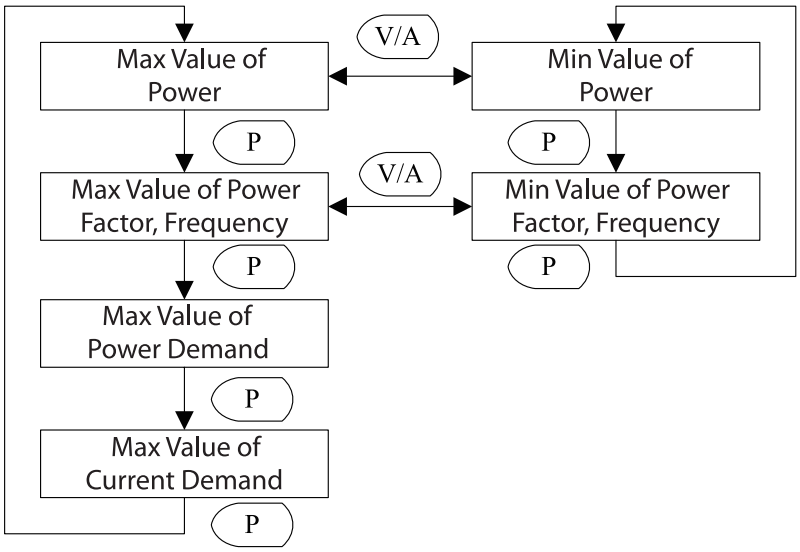


Fig 3-9 The Max Value of Power Display Module Keys Operation Flowchart

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.

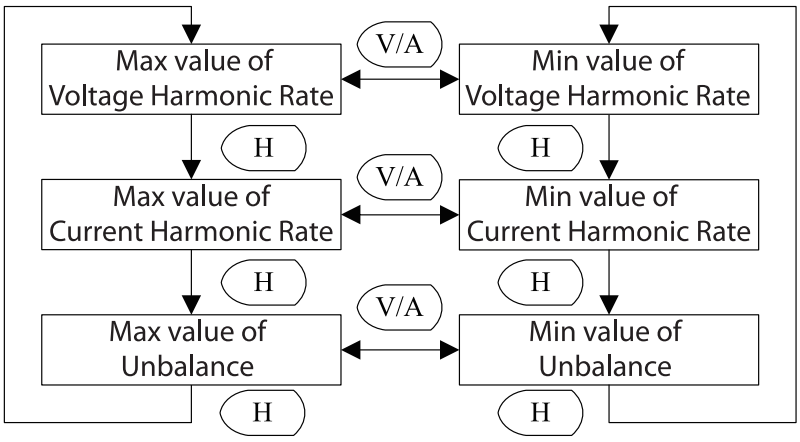


Fig 3-10 The Keys Operation of Harmonic Distortion the Most Value Module

Note: When the voltage wiring for the 1LL, no Uc, Ic THD; when the voltage wiring set 1LN, only show Ua and Ia 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:

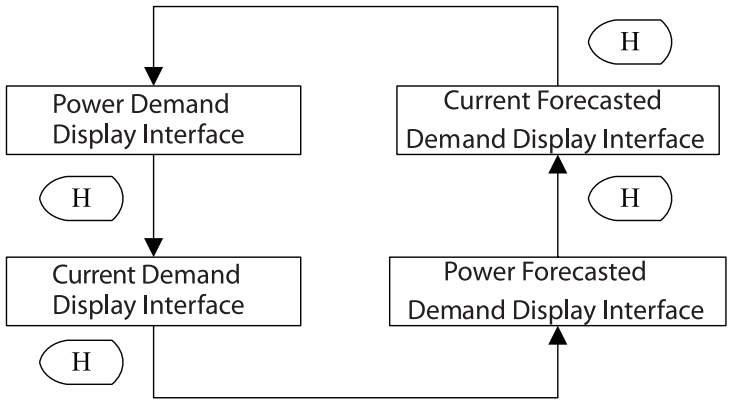


Fig 3-11 Demand Display Module Keys Operation

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

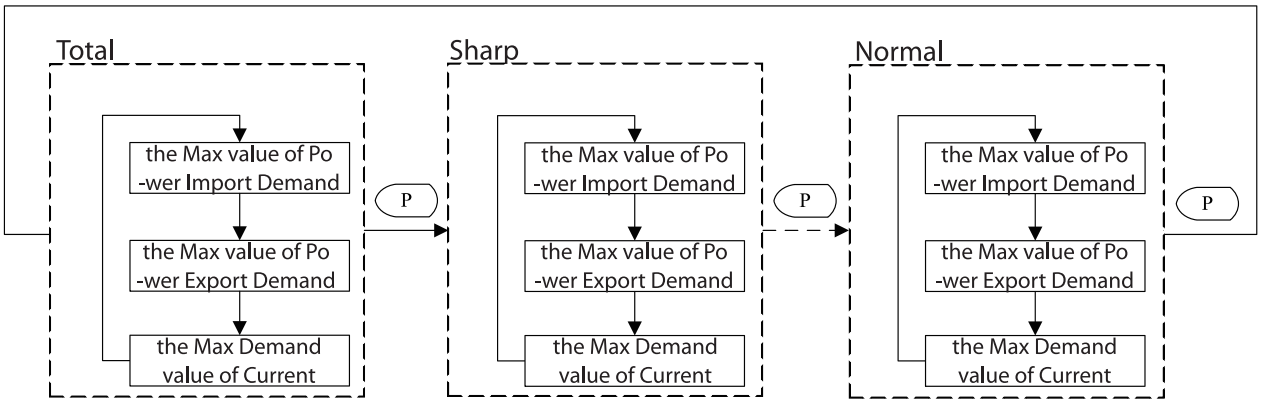


Fig 3-12 TOU Demand Keys Operation

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:

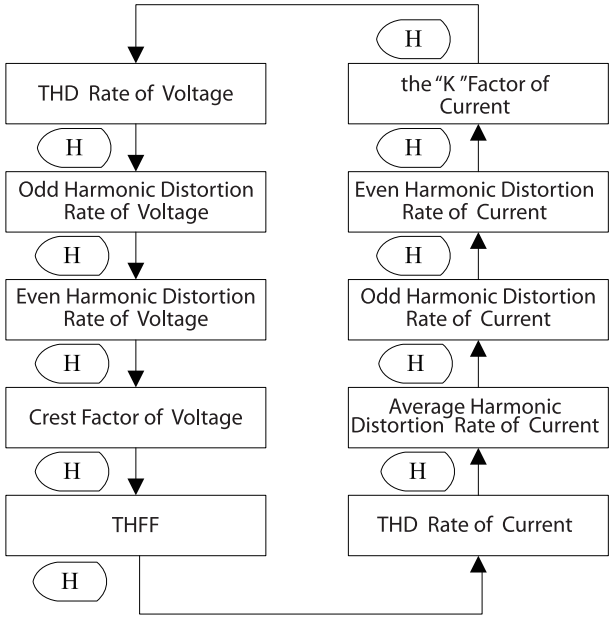


Fig 3-13 Harmonic Basic Parameter Displays Key Operational Processes

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:

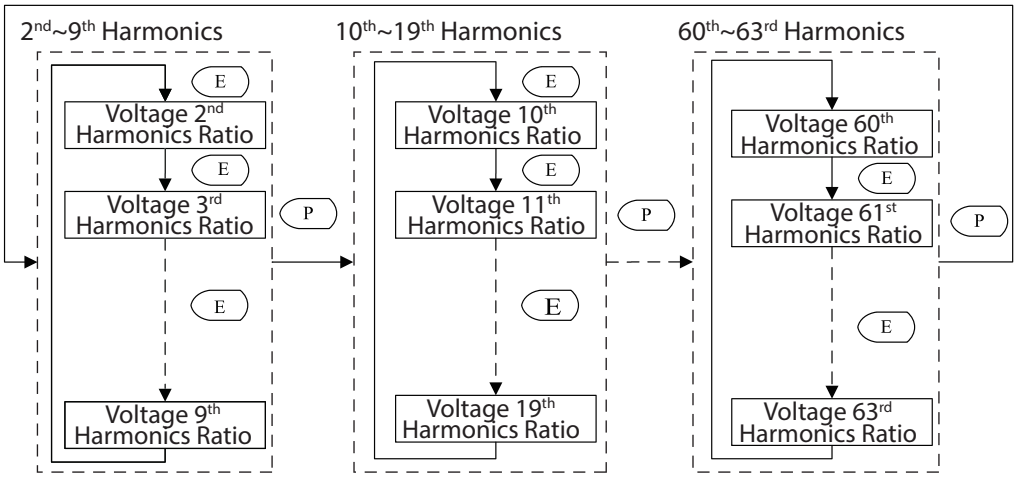


Fig 3-14 Each Harmonic Key Operation Flowchart

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	1200/2400/4800/9600/19200/38 400/57600
	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	PrI: 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_{tatol}/ 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:

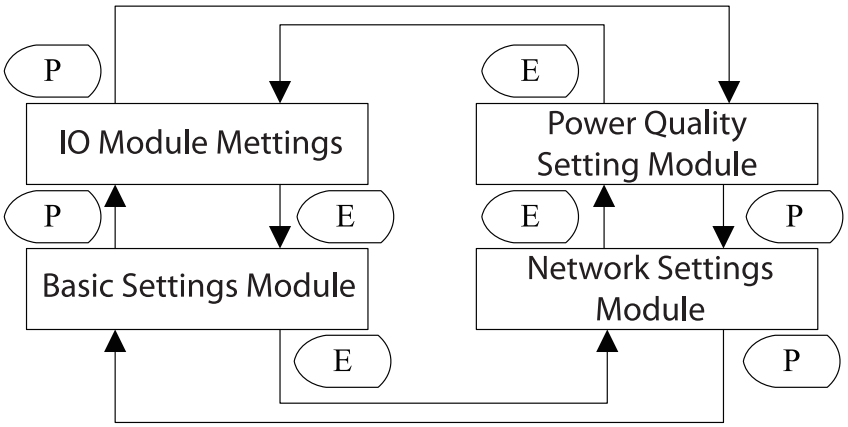


Fig 3-15 Settings Key Module Operation Flowchart

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).

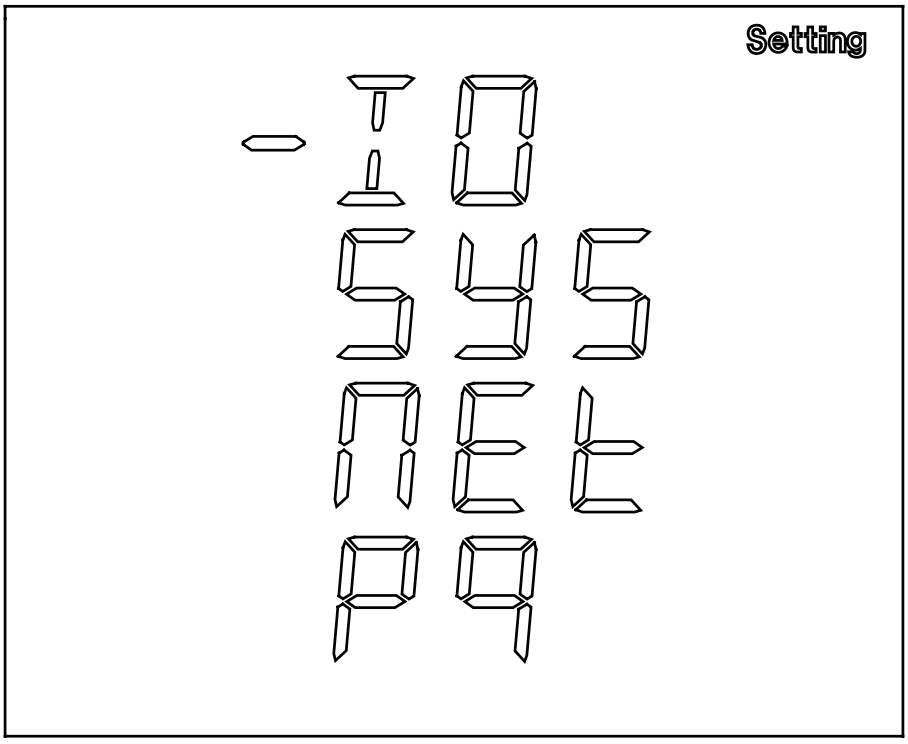


Fig 3-16 Interface Module Selection

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:

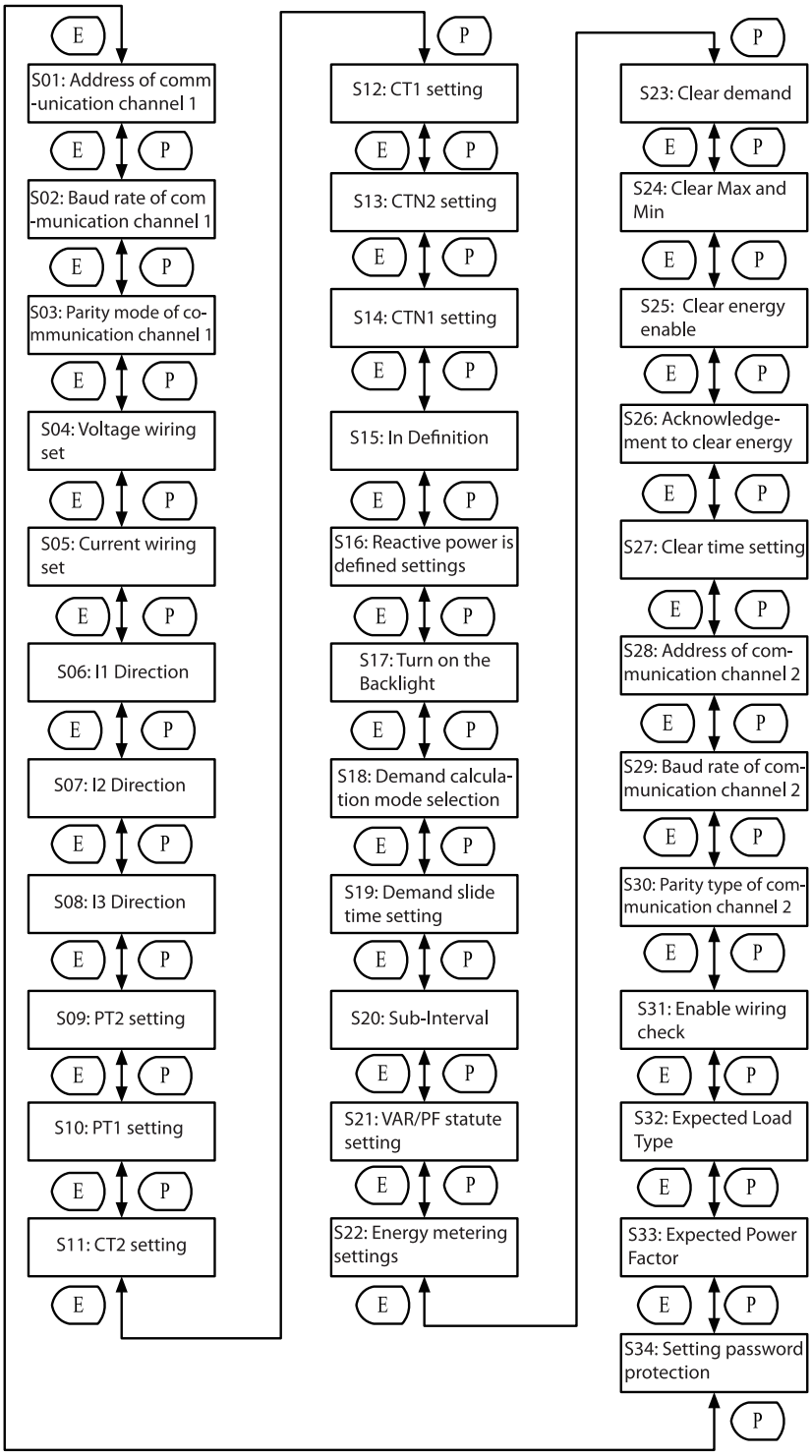


Fig 3-17 Basic Settings Module Key Operational Processes

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.

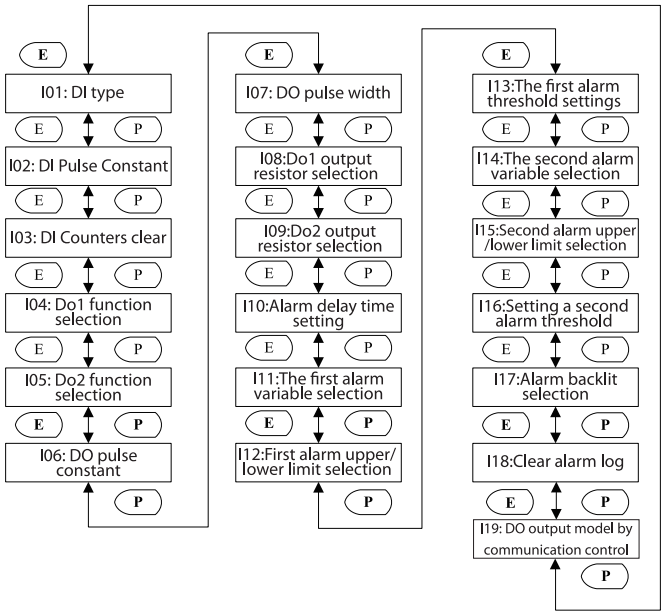


Fig 3-18 I/O Module Settings Key Operation Flowchart

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:

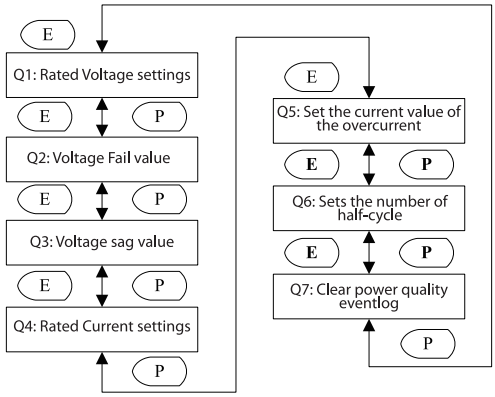


Fig 3-19 Power Quality Module Flip Operation

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:

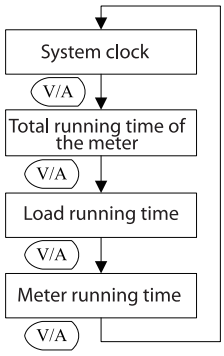


Fig 3-20 Time Information Key Operation

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

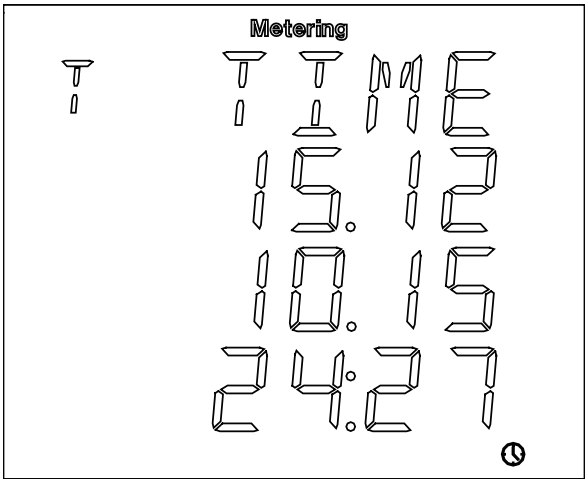


Fig 3-21 System Time Display

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.

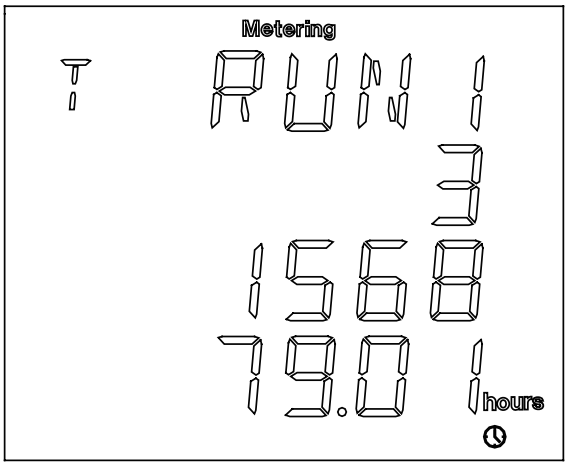


Fig 3-22 Meter Run Time Display

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.

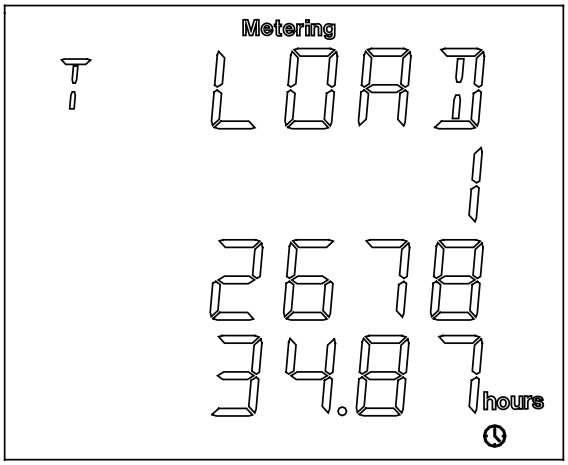


Fig 3-23 Load Running Time Display

3.7.1 Result of Wiring Check

The following figure shows how it scrolls.

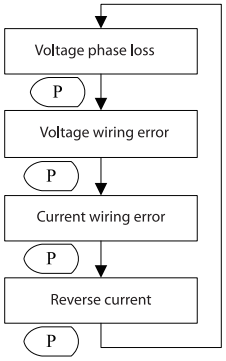


Fig 3-24 Wiring Judgment Result Shows the Key Processes

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.

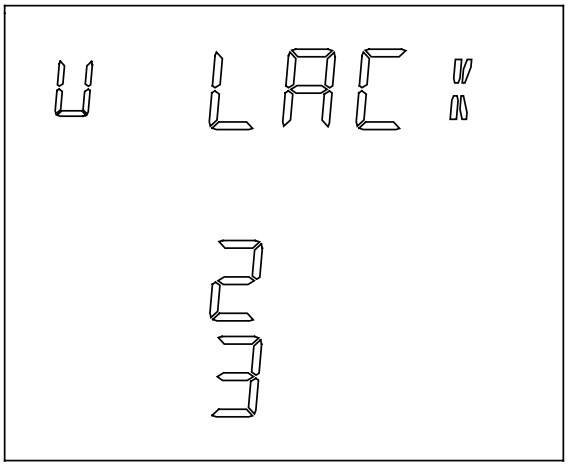


Fig 3-25 B Phase and C Phase Loss

3.7.2 System Information

The version information module key operational processes is shown below.

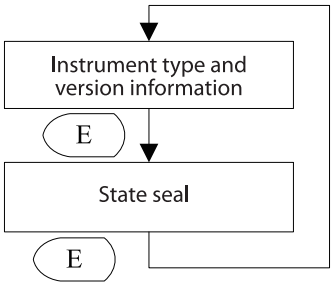


Fig 3-26 System Information Key Operation

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.

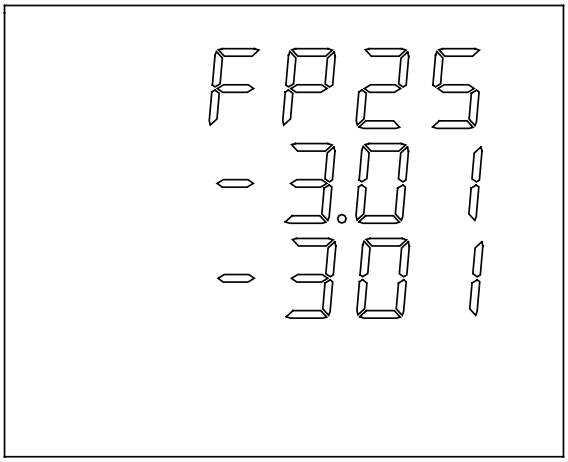


Fig 3-27 Version Information Display Interface

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.

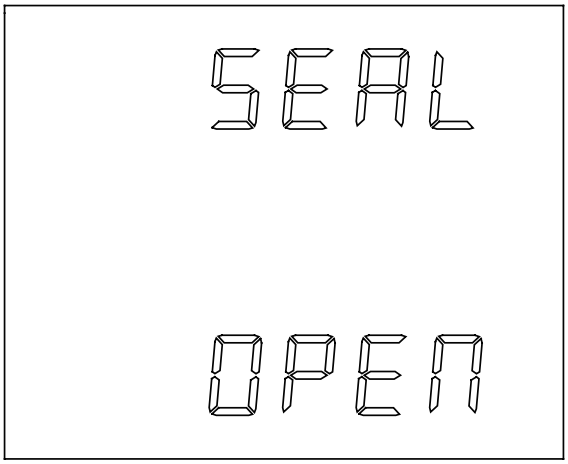


Fig 3-28 Seal Status Display

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).

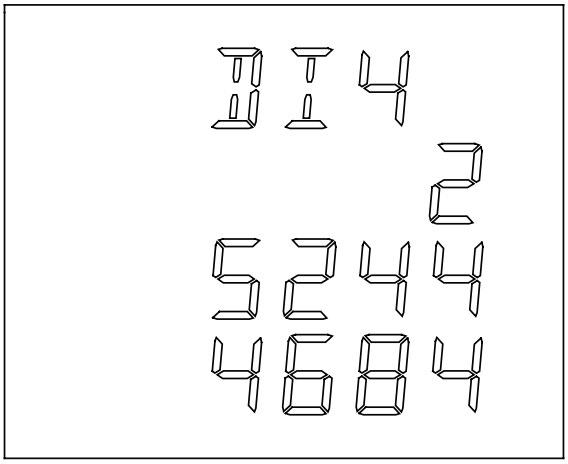


Fig 3-29 DI Count Display

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:

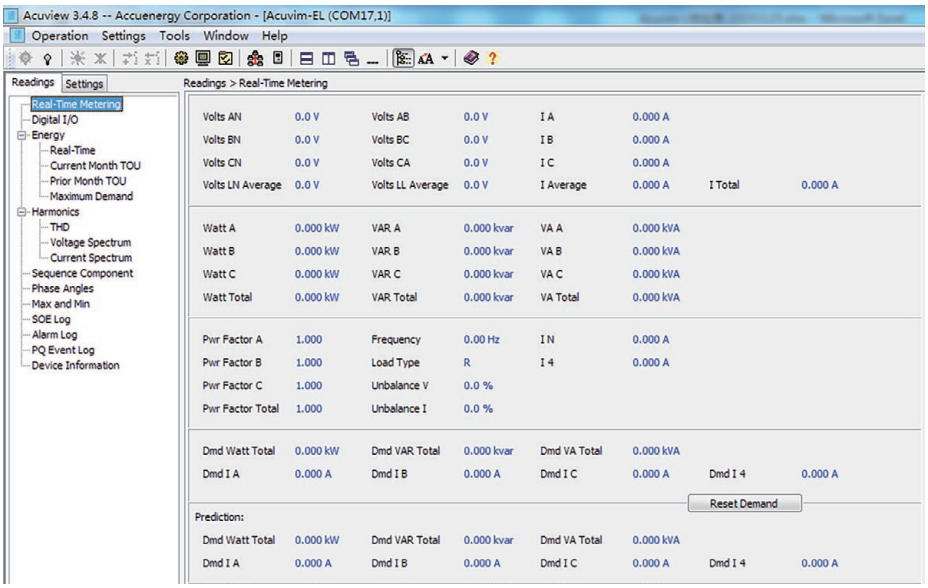


Fig 4-1 Basic Measurement Parameter Display Interface

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.

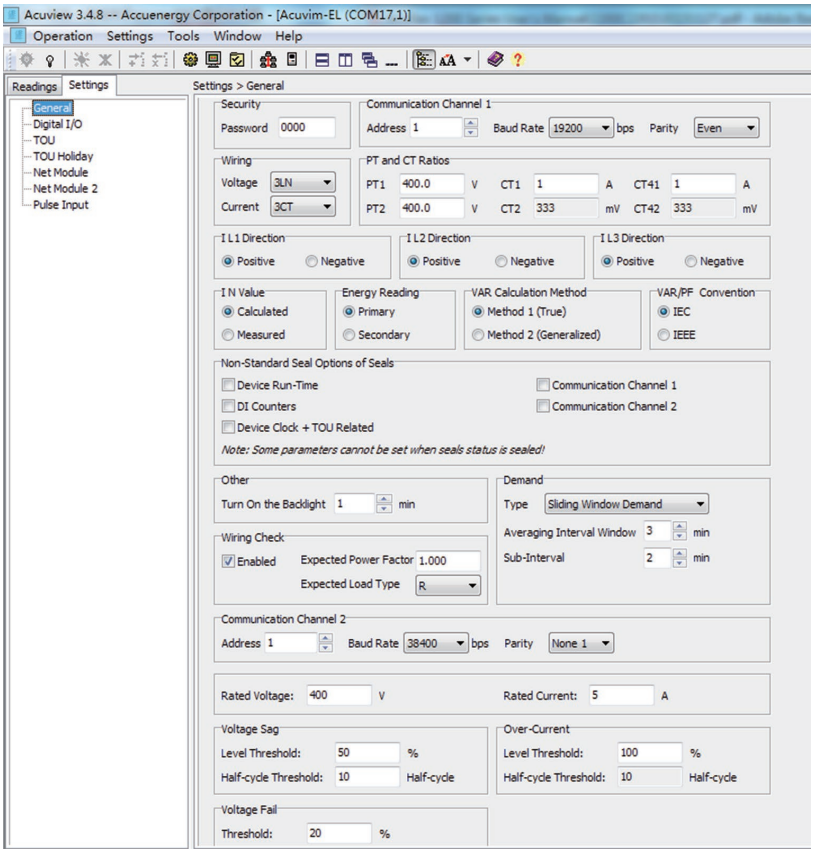


Fig 4-2 Basic Set of Software Tools Display Parameters

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, kVArh 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

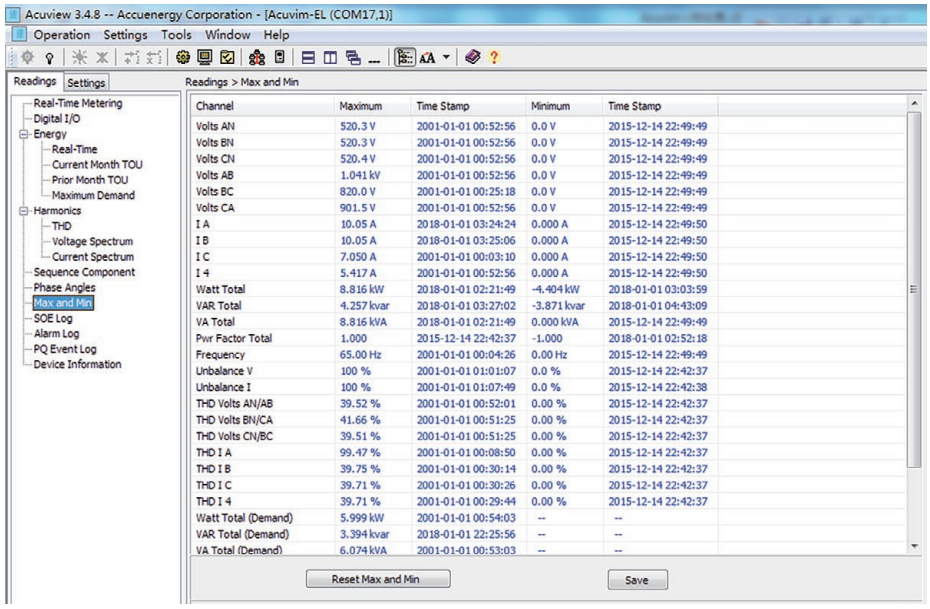


Fig 4-3 Statistics Display

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.

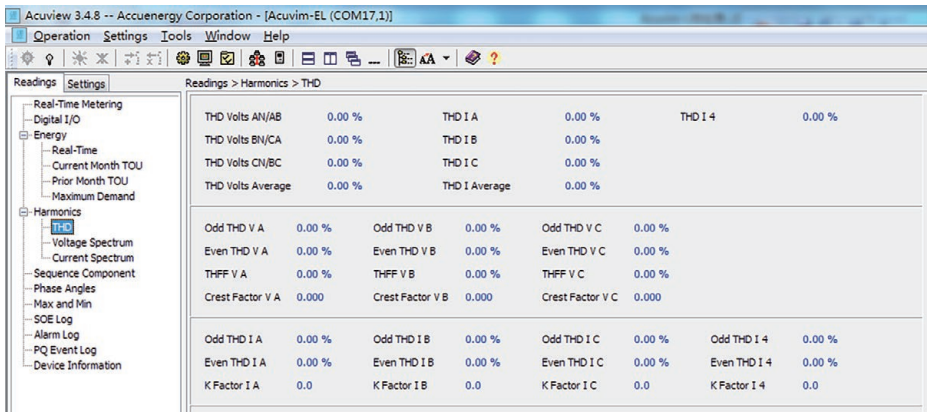


Fig 4-4 Power Quality Display Interface

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.

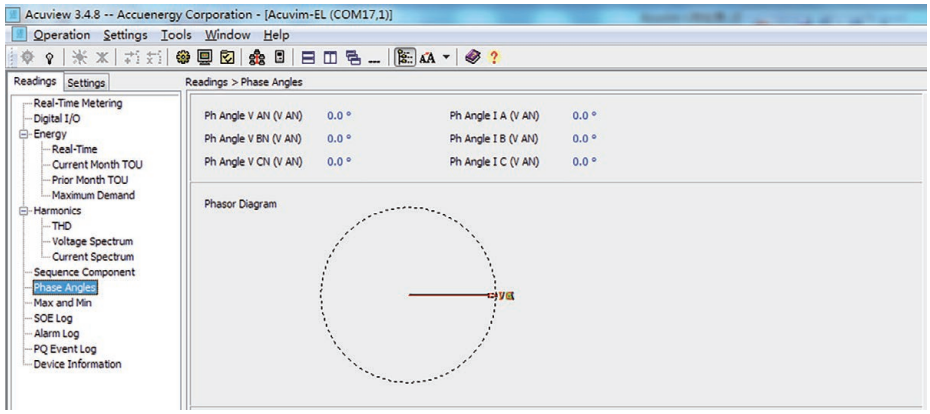


Fig 4-5 Phase Angle Display Interface

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.

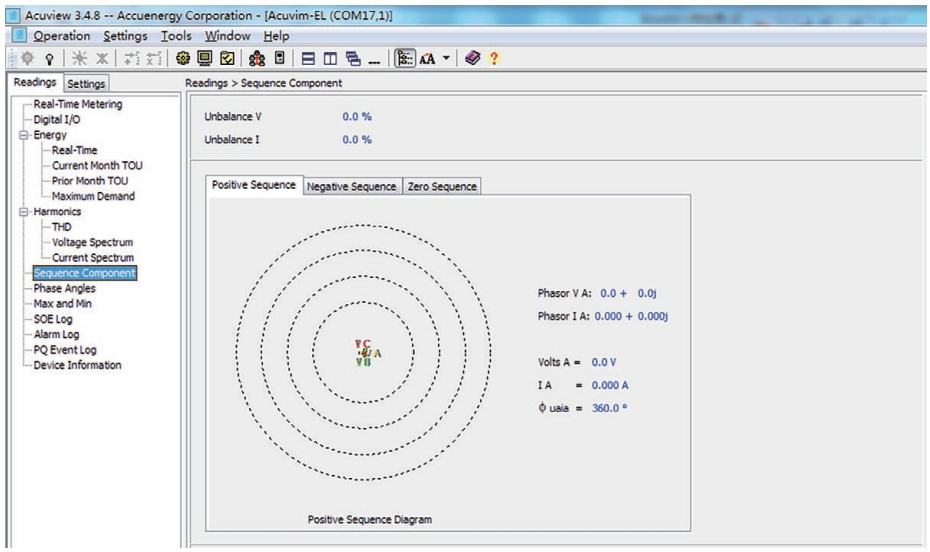


Fig 4-6 Sequence Component Display Interface

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 Acuview 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.

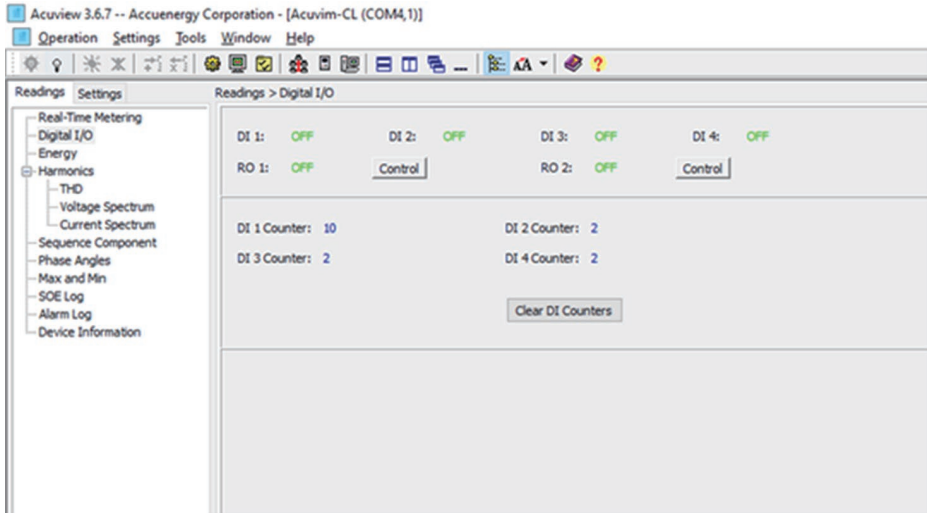


Fig 4-6-a

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.

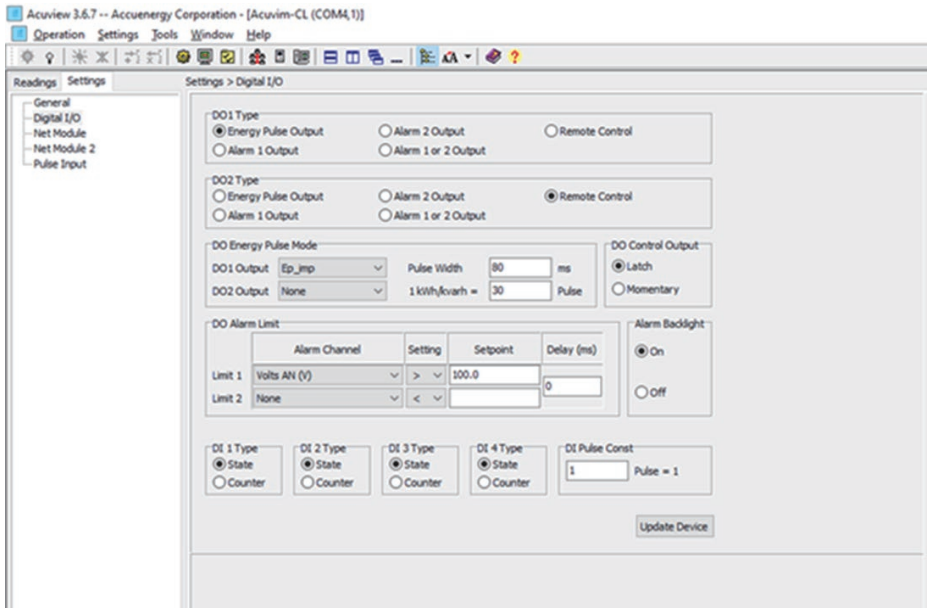


Fig 4-6-b

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.

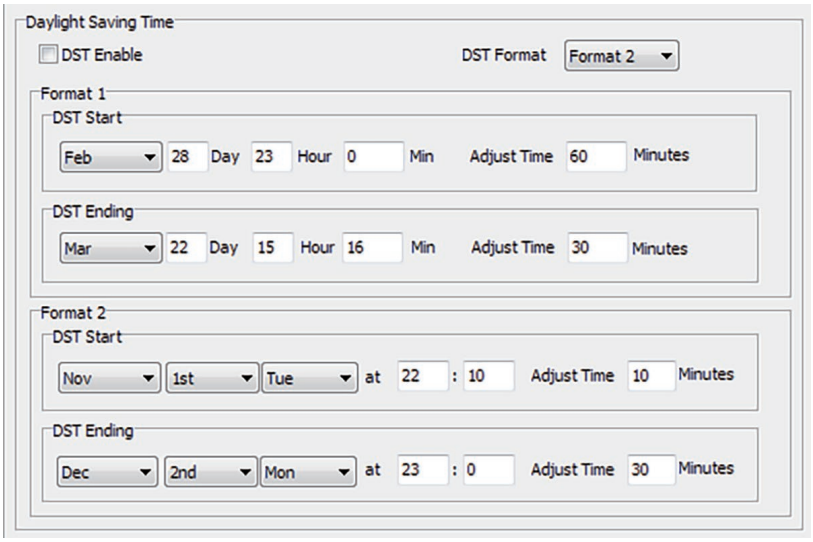


Fig 4-7 Daylight Saving Time Setting Interface

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.

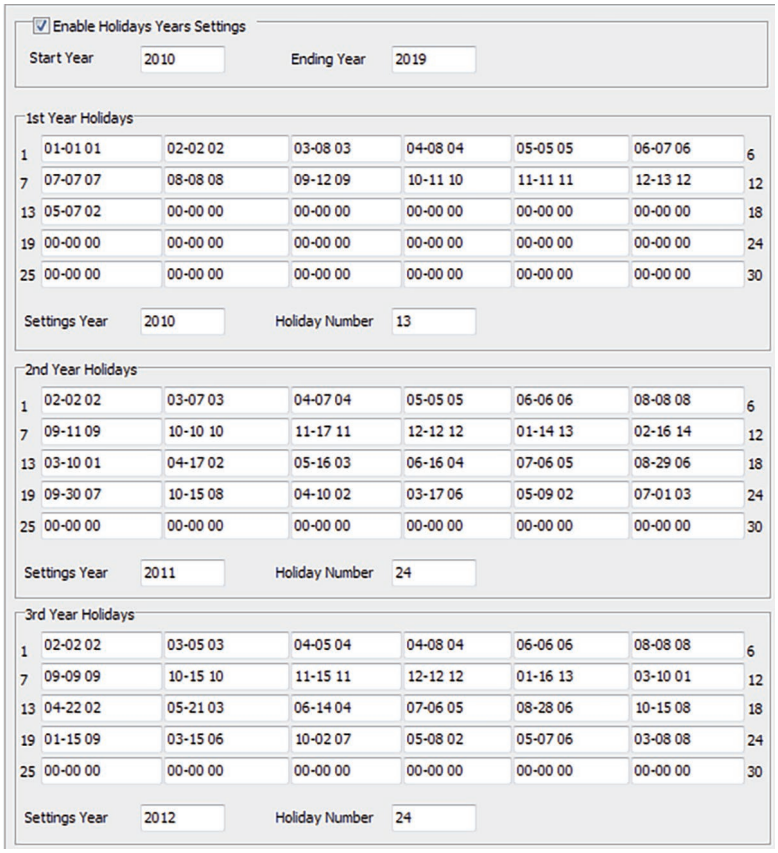


Fig 4-8 Setting the Interface Holidays

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.

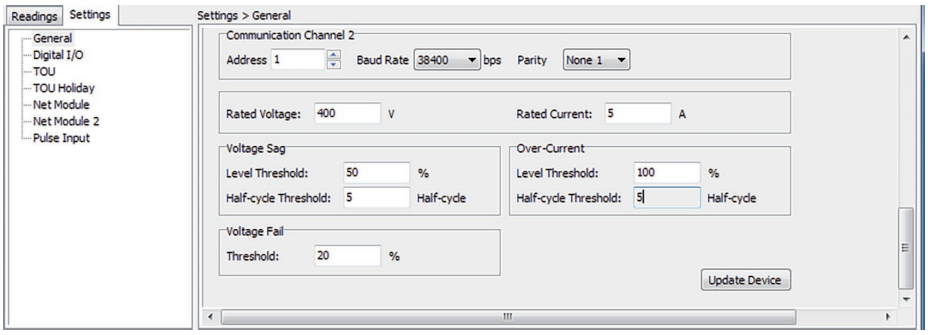


Fig 4-9 Power Quality Setting Interface

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.

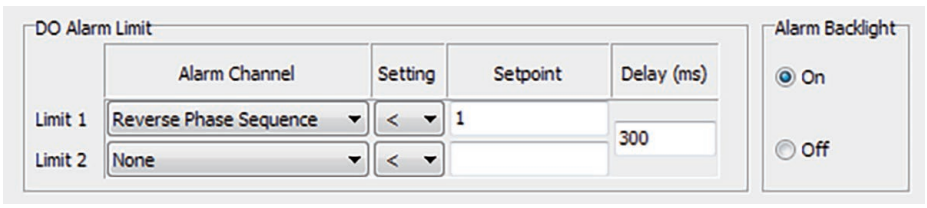


Fig 4-10 Alarm Settings Interface

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.

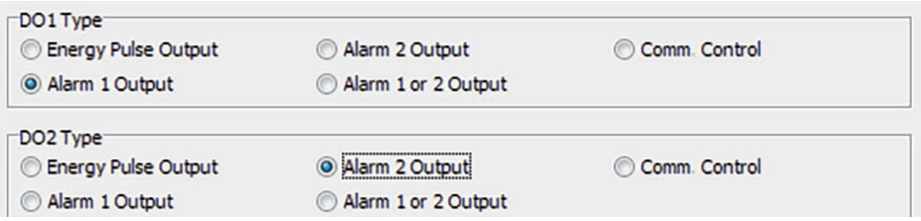


Fig 4-11 DO Output Selection Setting

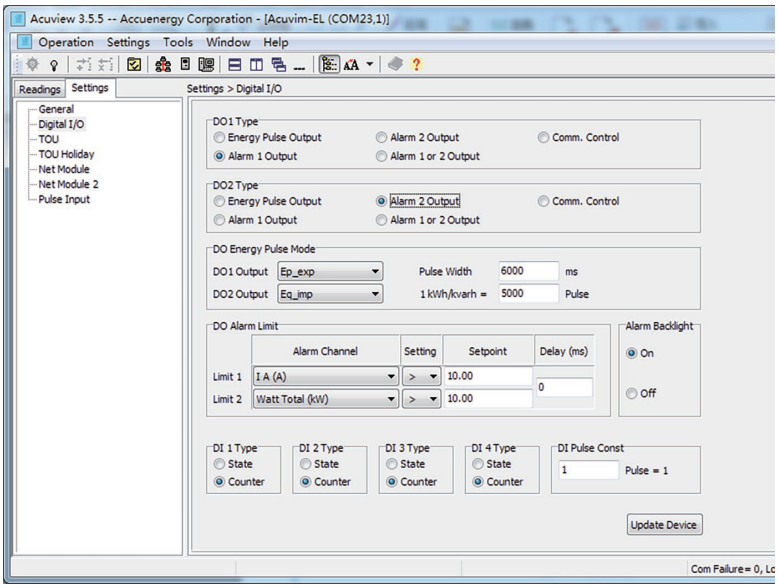


Fig 4-12 I/O Interface Settings

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.

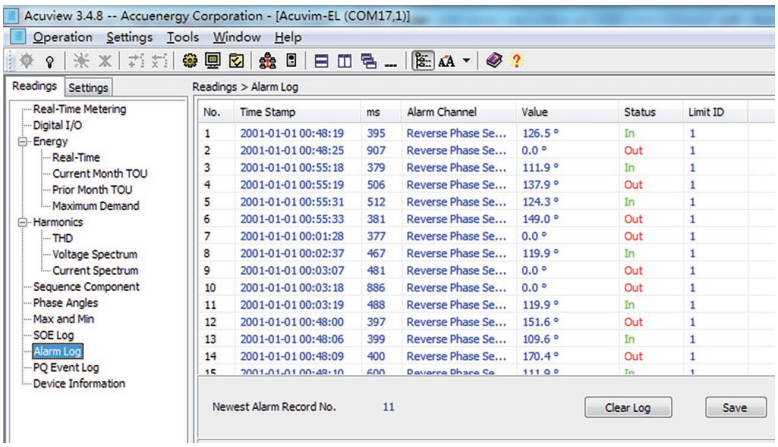


Fig 4-13 Alarm Log Display Page

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 CRCregister.
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 × (PT1 / PT2) /10	Volt(V)
Current I1, I2, I3, In (Calculated)	I=Rx ×(CT1/CT2) /1000	Amp(A)
In (Measured)	I = Rx × (CTN1 / CTN2) / 1000	Amp(A)
Power Pa, Pb, Pc, Psum	P=Rx × (PT1 / PT2) × (CT1/ CT2)	Watt(W)
Reactive power Qa, Qb, Qc, Qsum	Q=Rx × (PT1 / PT2) × (CT1/ CT2)	var
Apparent power Sa,Sb,Sc,Ssum	S=Rx × (PT1 / PT2) × (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)×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	UIIavg	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/10000×100%	NA
Harmonic content	THDn=Rx/10000×100%	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 availably 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:

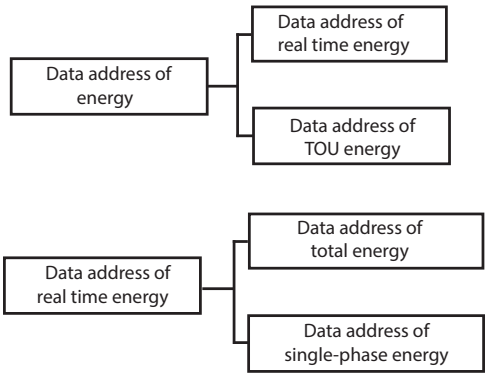


Fig 5-1 Division Plans of Energy Address

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 ofaccess
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)	Ep = Rx/10	kWh
Power energy Ep_imp, Ep_exp (Secondary side)	Ep = Rx/1000	kWh
Reactive energy Eq_imp, Eq_exp (Primary)	Eq = Rx/10	KVARh
Reactive energy Eq_imp, Eq_exp (Secondary side)	Eq = Rx/1000	KVARh
Apparent energy Es (Primary)	Es = Rx/10	KVAh
Apparent energy Es (Secondary side)	Es = Rx/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.

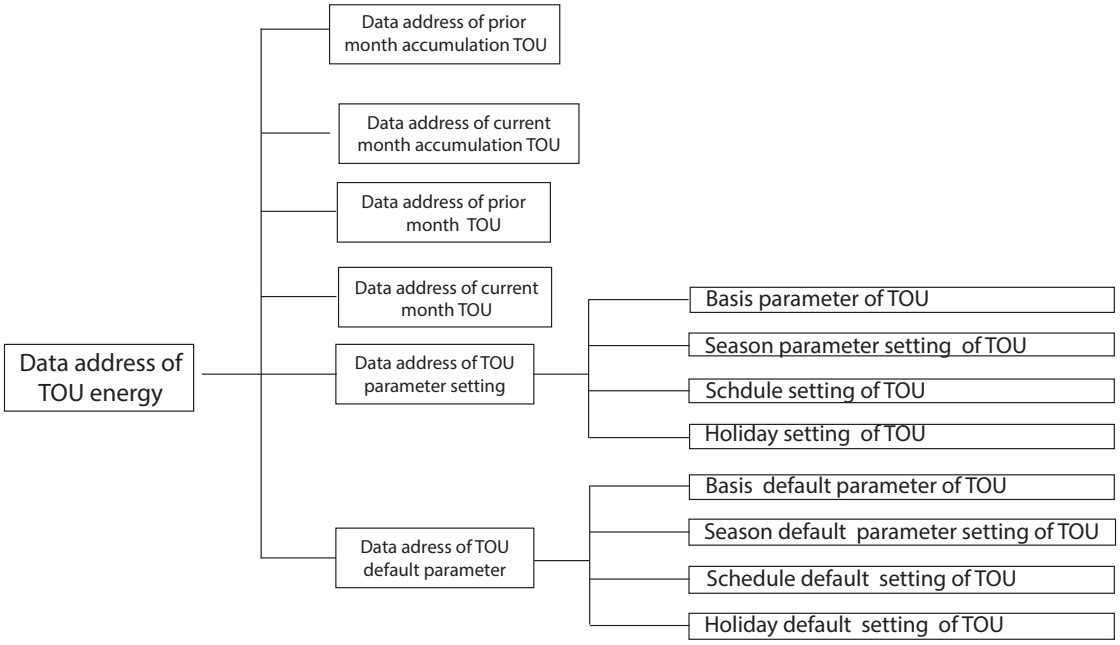


Fig 5-2 Division Plan of TOU Energy

Table 5-26 Data Address of Prior and Current Month

Address	Parameter	Data Range	Datatype	Type ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 l (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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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 ofaccess
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	Total Reactive Energy Eq_total (Valley)	0~999999999	Dword	R/W
395AH-395BH	Total Reactive Energy Eq_total (Normal)	0~999999999	Dword	R/W
395CH-395DH	Total Reactive Energy Eq_total (Total)	0~999999999	Dword	R/W
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	Net Reactive Energy Eq_net (Valley)	-999999999~999999999	Dword	R/W
3964H-3965H	Net Reactive Energy Eq_net (Normal)	-999999999~999999999	Dword	R/W
3966H-3967H	Net Reactive Energy Eq_net (Total)	-999999999~999999999	Dword	R/W
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 ofaccess
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 ofaccess
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	R
3B10H-3B13H	Time Stamp and Max Import Power Demand (Normal) Time Stamp and Max Import Power Demand (Total)	Same As Above	Integer	R
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) Time Stamp and Max Export Power Demand (Total)	Same As Above	Integer	R
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	R
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) Time Stamp and Max IN Demand (Peak) Time Stamp and Max IN Demand (Valley) Time Stamp and Max IN Demand (Normal) Time Stamp and Max IN Demand (Total)	Same As Above	Integer	R
3BB8H-3BBBH		Same As Above	Integer	R
3BBCH-3BBFH		Same As Above	Integer	R
3BC0H-3BC3H		Same As Above	Integer	R
3BC4H-3BC7H		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-2827H	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 × 109 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, ③1A(333mV), ④ 1A (100mV Rope- CT), ⑤ 1A(80mA/100mA/200mA), ⑥ 1A (6.68mA)
Metering Range	① 0~10A, ② 0~2A, ③0~1.2A, ④ 0~1.2A,...⑤ 0~1.2A, ⑥ 0 ~ 1.2A
Pickup Current	① 5mA, ② 1mA, ③5mA, ④ 5mA, ⑤ 5mA, ⑥ 5mA
Withstand	20Arms continuous 100Arms for 1 second, non-recurring
Burden	0.05VA (typical) @ 5Arms
Accuracy	0.5%
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 1minute
Input Impedance	2Mohm per phase
Metering Frequency	45Hz~65Hz
Pickup Voltage	10Vac
Accuracy	0.5%

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	0.5%	0.1V	20V~1000kV
Current	0.5%	0.001A	0~50000A
Current Demand	0.5%	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	0.2%	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	1.5x107

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**

+ I/O Module *(Optional)*	- Logic Module
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
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**

+ Accessories *(Optional)*	
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**

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

MAKE ENERGY USAGE SMARTER

Accuenergy (Canada) Inc.

Los Angeles - Toronto - Beijing - Pretoria

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

Web: www.accuenergy.com

Email: marketing@accuenergy.com

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