AcuRev 2000

Smart Metering System
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 specifcations before ordering.

Please read this manual carefully before installation, operation and maintenance of AcuRev 2000 series meter. The following symbols in this manual are used to provide warning of danger or risk during the installation and operation of the meters.

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

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

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

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Welcome to AcuRev 2000!

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

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

Chapter 1 Introduces the basic AcRev 2000 features and application areas.

Chapter 2 Introduces AcuRev 2000 installation and wiring methods in detail.

Chapter3 Walks through how to operate AcRev 2000 via the display panel, display measurement data and parameter settings.

Chapter 4 Introduces AcuRev 2000 functions with the included software.

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

Appendix The appendix provides AcuRev 2000 technical specifications and ordering information.

Chapter 1 Introduction

1.1 Meter Overview

1.2 Areas of Application

1.3 AcuRev 2000 features

1.1 Meter Overview

AcuRev 2000 series performs real-time metering, measures energy consumption and monitors power quality for up to 18 single phase circuits(or 6 three phase circuits)in one unit. It is an advanced intelligent power meter that Accuenergy developed and manufactured for the next generation smart grids. The main features include multi-tenants submetering, cyclic display, tamper proof, which make it highly suitable for large commercial facilities, residential apartments and industrial environments. AcuRev 2000 series has infrared, RS485 and Ethernet communication options as well as I/O options (e.g. Pulse Counting from water or gas meters), making it useful in energy management systems. Due to its communication capability, ease of installation and use, this product can be easily integrated into new and existing energy management systems.

Measurement Function

Voltage: Line Voltage; Phase Voltage

Current: In-line Current; Each Tenant Current

Power and Power Factor: In-line and Each Tenant Power, Reactive Power, Apparent Power, Power Factor

Frequency: System Frequency

Demand: In-line and Each Tenant Power and Current Demand.

Energy Function

Energy (kWh) measurement meeting international standards.

Accuracy is Class 1.0.

It has Time of Use feature: 14 Seasons, 14 Schedules, 4 Tariffs, supporting weekend and holiday settings. It supports kWh pulse output.

System Event Logging

This product runs self-check on systems. When an important operation is performed (such as reset, energy or demand clear, system parameter changes), it immdediately records the event timestamp, event type (via event state word), and judges whether relay output needs to be sent.

Over/Under Limit Alarming

Users can select parameters and set their setpoints.An alarm will be triggered when the setpoint is reached.At the same time, sound and light signals could be sent out via relay output. The time and reason of an alarm event will be recorded.

Power Quality Analysis

Power quality parameters such as voltage and current THD, individual voltage and current harmonics, voltage crest factor, current K factor, voltage and current unbalance etc. will be monitored.

I/O Option

Standard output ports provide energy (kWh) pulse output and time pulse output; digital inputs (DI) provide pulse counting from water, electricity and gas meter, and monitor switch status; relay outputs (RO) react upon alarming conditions.

Data Logging and Load Trending

With 4MB of onboard memory, AcuRev 2000 series can log real-time metering parameters, I/O status, and energy measurement. This information can be used for historical trending and system analysis.

Communication and Network

Supports RS485 communication open protocol: Modbus RTU; supports 10/100M Ethernet interface with protocol Modbus TCP, SMTP, HTTP, DLMS/COSEM; meter reading via infrared port.

1.2 Areas of Application

- Large Commercial Centers
- Schools
- Hotel/Office Buildings
- Condominium/Residential Buildings
- Industrial Environment
- Railway Transportation
- Public Infrastructures
- Intelligent Power Distributions
- Energy Management Systems
- Energy Saving Systems

1.3 AcuRev 2000 series Features

Multifunction, Multi-Tenants

AcuRev 2000 multi-tenants intelligent power meter utilizes powerful data acquisition and processing functions, which implements real-time metering and monitoring for up to 18 single phase circuits (or 6 three phase circuits) in one unit. It will also record system events, over/under limit alarming and data logging functions.

Innovative Display and Installation

Multi-tenant energy information is cycled through on the high resolution display. The display panel has two options: embedded in the unit or externally installed on a panel. Current input has two options: direct input 20(80A)or external CT model.

Flexible Wiring

Users can choose measuring circuits and wiring methods. Measuring circuit can be selected as 9 or 18 single phases, three phase 3x3 or 3x6, including single phase in single phase out(1LN-1LN), three phase 4 in single phase out (3LN-1LN), three phase 4 in three phase 4 out(3LN-3LN), three phase 3 in 3 out (3LL-3LL), single phase 3 in single phase 3 out(2LN-2LN), where "in" means the line side, "out" means the load side.

Model Selection

AcuRev 2000 series has two models: AcuRev 2010(Basic Measurement) and AcuRev 2020(Multifunction). The function comparison is listed below:

● Standard; ⊙ Optional; Blank means Not Available

Function		Parameter	AcuRev 2010	AcuRev 2020
Energy	Real Energy	Ep	●	●
	Reactive Energy	Eq		●
	Apparent Energy	Es		●
TOU	4 Tariffs, 14 Schedules	TOU	●	●
Power Demand	Power Demand	Demad_P	●	●
	Power Demand Max	Demad_P_max	●	●
Current Demand	Current Demand	Line & Each Tenant		●
	Current Demand Max	Line & Each Tenant		●
Real-time Parameter	Phase Voltage	V1, V2, V3		●
	Line Voltage	V12, V23, V31		●
	Current	Line & Each Tenant		●
	Power	Line & Each Tenant	●	●
	Reactive Power	Line & Each Tenant		●
	Apparent Power	Line & Each Tenant		●
	Power Factor	Line & Each Tenant		●
	Frequency	F		●
Power Quality	THD	THD		●
	Individual Harmonic	2nd-31st		●
	Current K Factor	KF		●
	Crest Factor	CF		●
	Voltage Unbalance	U_unbl		●
	Current Unbalance	I_unbl		●
Clock	Year Month Day Hour Minute Second		●	●

Alarming	Over/Under Limit Alarm		●	●
Data Logging	Up to 4M		●	●
Communication	Infrared		●	●
	RS485		●	●
	Ethernet		⊙	⊙
Communication Protocol	MODBUS-RTU		●	●
I/O	Demand Cycle, Second Pulse, 2-channel kWh Pulse Output		●	●
	8-channel Digital Output		⊙	⊙
	4-channel Digital/ Alarming Output		⊙	⊙
Display	LCD Display		●	●

Table 1-1 Model Selection

Chapter 2 Installation

2.1 Appearance and Dimensions

2.2 Installation Methods

2.3 Wiring

Before Installtion

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

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

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

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

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

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

◘ Use dry cloth to wipe the meter.

Note: Failure to follow manufacturer guidelines for installation and use may compromise the safety of the meter and the user.

Note: Any repair should only be performed by the manufacturer.

A switch or circuit breaker should be utilized in the equipment. The switch should be placed close to the equipment and easy to reach.The switch is regarded as a part of the breaking device.

2.1 Appearance and Dimensions

Category	Appearance
Meter Base	LxWxH 140×105.4×77.7mm
External CT Module(EM)	LxWxH 67×105.4×77.7mm
Internal CT Module(DM)	LxWxH 153×105.4×77.7mm
Display Module	LxWxH 72×72×26.5mm

Table 2-1 AcuRev 2000 Appearance

Meter Base

If a Display Module is ordered, an RJ45 jack is equipped in the Meter Base, where the attached cable should be pluged in to connect the Display Module to the Meter Base. See Figure 2-1.

If the Display Module is not specified, the Display Module is embedded in the Meter Base. See Figure 2-2.

Appearance:

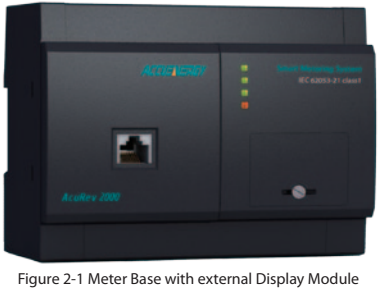


Figure 2-1 Meter Base with external Display Module

Figure 2-2 Meter Base with embedded Display Module

Dimensions

Unit: mm

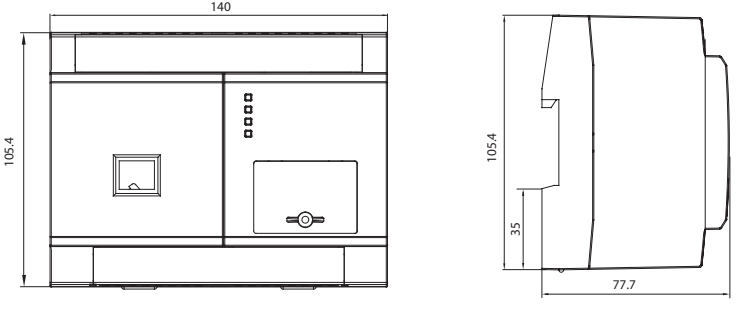


Figure 2-3 Meter Base dimensions

Display Module

The Display Module can also be panel mounted.

Appearance

Figure 2-4 Display Module

Dimensions

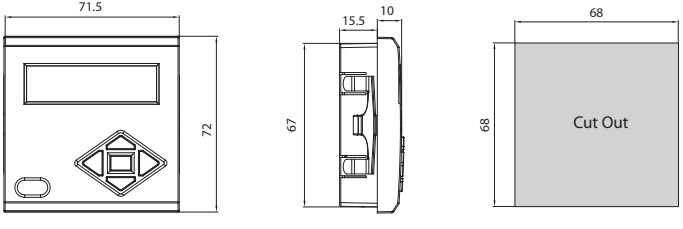


Figure 2-5 Display Module dimensions

External CT Module(EM)

Appearance

Figure 2-6 EM module appearance

Dimensions

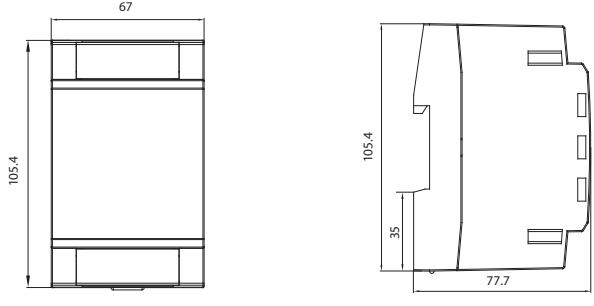


Figure 2-7 EM module dimensions

Internal CT Module (DM: Direct Module)

Appearance

Figure 2-8 DM module appearance

Dimensions

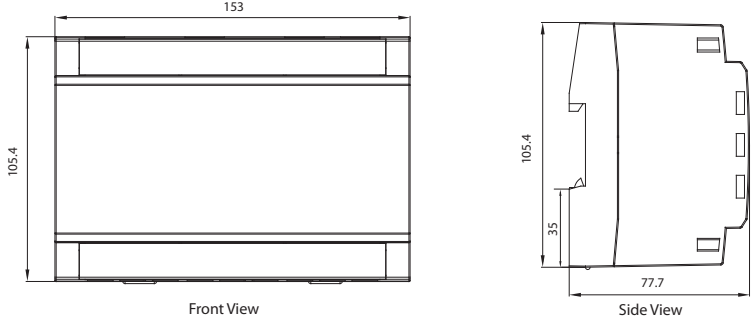


Figure 2-9 DM module dimensions

2.2 Installatin Methods

Environmental

Before installation, please check the environment, temperature and humidity to ensure the Acuvim 2000 series meter is being placed where it will not be damaged.

1. Temperature

AcuRev 2000 operating temperture is -25~70°C.Exceeding this temperature range will cause damage to the meter. Please note it can influence the meter life negatively if the meter operates in extremly high or extremly low temperatures. AcuRev 2000 storage temperature range is -40~85°C.

2. Humidity

5% to 95% non-condensing.

3. Location

AcuRev 2000 series meter should be installed in a dry and dust free environment. Avoid exposing meter to excessive heat, radiation and high electrical noise sources.

Installation of Meter Base and Modules

Below are examples of the assembled meter and modules.

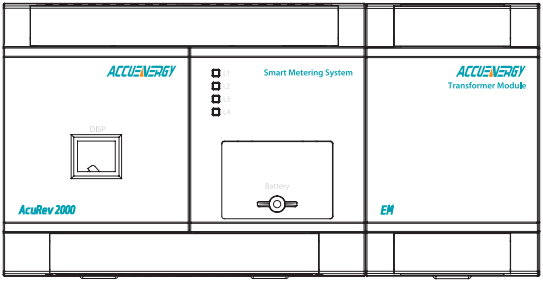


Figure 2-10 Meter Base connected with an EM module (9 channels)

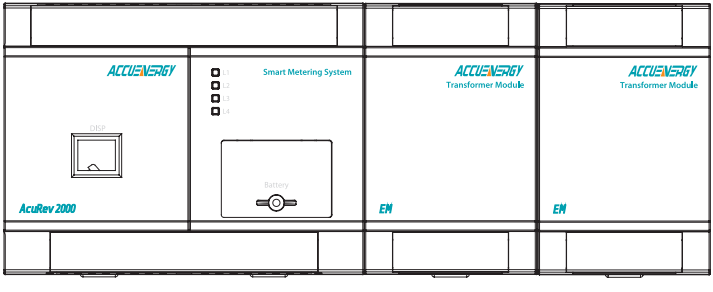


Figure 2-11 Meter Base connected with two EM modules(18 channels)

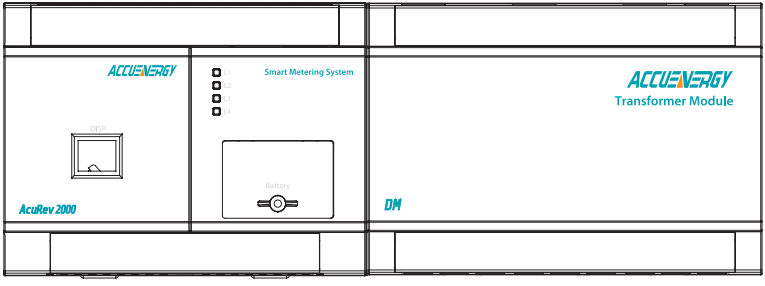


Figure 2-12 Meter Base connected with a DM module (9 channels)

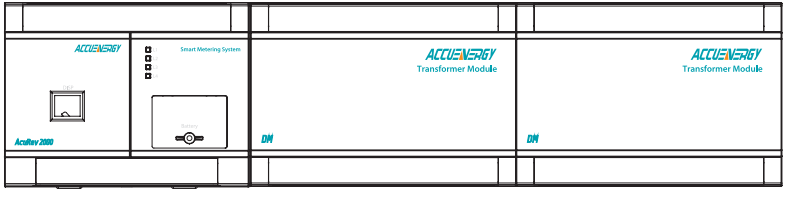


Figure 2-13 Meter Base connected with two DM modules (18 channels)

Installation Steps:

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

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

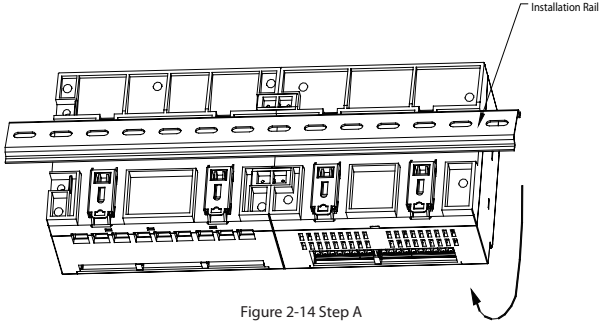


Figure 2-14 Step A

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

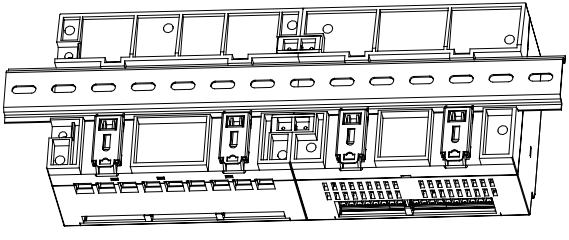


Figure 2-15 Step B

Display Module Installtion

The Display Module is factory installed on the meter base. Users can use the meter base and display module combination directly. The following steps show how Display Module is installed.

1)Firstly, make a standard panel Cut Out as the Figure 2-16 shows. Unit: mm.

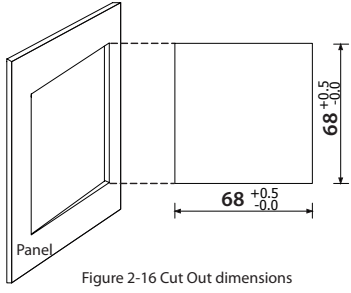


Figure 2-16 Cut Out dimensions

2)Remove the clips of Display Module, install the module into the Cut Out in the direction of arrow.

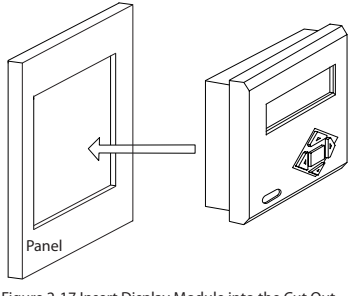


Figure 2-17 Insert Display Module into the Cut Out

3)Install the Display Module into the Cut Out. The module front panel will appear at the front of the Cut Out, the Meter Base case and wiring terminals will appear at the back of the Cut Out.Then, put on two installation clips following the grooves at the back of Display Module, and push forward to tighten the clips.Make sure the clip and the panel are joined tightly. Tighten the screws as Figure below shows and the installation is completed. See Figure 2-18.

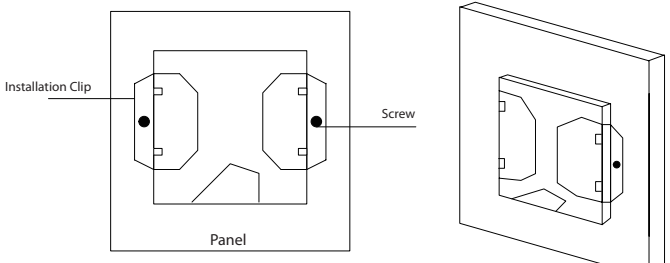


Figure 2-18 Use clips to affix the Display Module

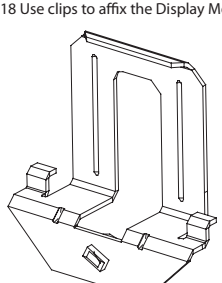


Figure 2-19 Installation Clip

2.3 Wiring

Terminals

Meter Base Terminals

Upper row: Power Supply, Pulse Output, Communication, NET

Lower row: Digital Input, Relay Output.

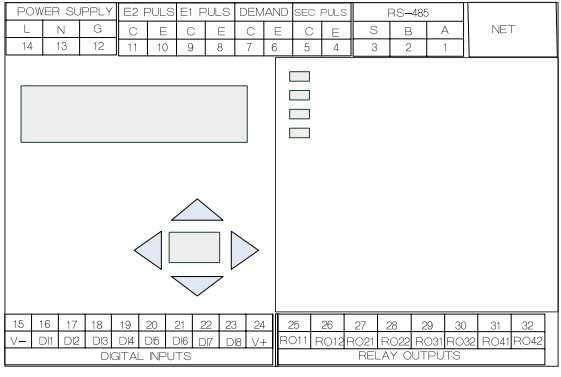


Figure 2-20 Meter Base Terminals

External CT Module(EM)Terminals

The upper row has voltage input terminals, the lower row has current input terminals.9 channel inputs correspond to I1-I9, it only requires one EM1 module.18 inputs correspond to I1-I18, it requires two modules: EM1 and EM2.The following figure shows 18 channel inputs.

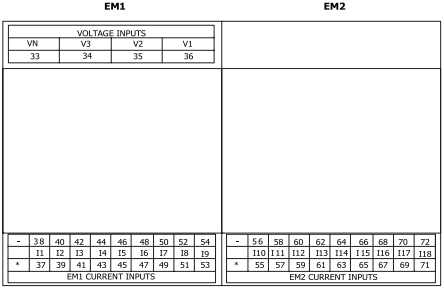


Figure 2-21 External CT Module terminals

Internal CT Module(DM)Terminals

The upper level has voltage input terminals, the lower level has voltage output terminals.

9 channel inputs corresponds to V1-V3, it only requires one DM1 module.18 channel inputs corresponds to V1-V6, it requires two modules: EM1 and EM2.

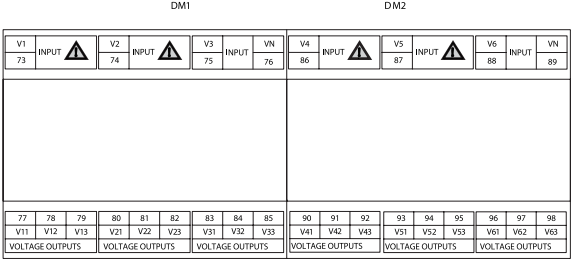


Figure 2-22 DM module terminals

Aux. Power Supply

AcuRev 2000 power supply is 100-415Vac, 50/60Hz or 100-300Vdc, which are universally supported.If any other power supply is required, please contact the manufacturer.The power consumption of the power meter is low during normal operation, therefore, the power supply can be either via a standalone power supply or via the measured circuit. A regulator is recommendended where the voltage is not stablized.The power supply terminal number is L/N/G.

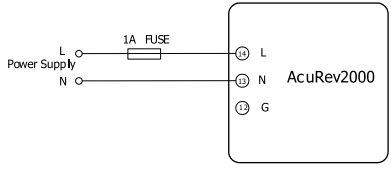


Figure 2-23 Power Supply wiring

Power Supply wiring is AWG22~16 or 0.6~1.5mm^2.

A fuse or small size circuit breaker is mandotary for AcuRev 2000 Power Supply. The fuse recommendation is 1A/250Vac, time delay.If a circuit breaker is utilized, it must be CE certified and comply with IEC 947 standard.

An isolated transformer or EMC flter should be used in the auxiliary power supply loop if there is a power quality problem in the power supply.

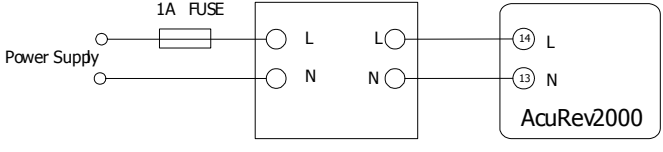


Figure 2-24 Power Supply wiring

Voltage Input signal

400Vac L-N , 690Vac L-L.A fuse (typical 1A/250Vac) or air circuit breaker must be used in the voltage input loop.

Current Input signal

Current Input has two options: Direct Connection or Via CT (Current Transformer) Connection.DM module is utlized in Direct Connection, while EM module is utilized in Via CT Connection.

For Direct Connection, each tenant maximum current is 80A, nominal current 20A.

For Via CT Connection, the CTs are solid core type, and should be installed first.The CT accuracy is 0.2%, options are 20A, 80A, 150A, 200A.

Vn Connection

Vn is the voltage reference point of AcuRev 2000, a low resistance to Vn connection contributes to a better measurement accuracy.Vn connection is related to the system wiring. Please refer to "Wiring Methods" for details.

Wiring Methods

AcuRev 2000 wiring methods can be selected in system parameter settings.The voltage wiring can be set as Single Phase In-Single Phase Out (1LN-1LN), Three Phase 4 In-Single Phase Out(3LN-1LN), Three Phase 4 In-Three Phase 4 Out(3LN-3LN), Three Phase 3 In-Three Phase 3 Out (3LL-3LL), Single Phase 3 In-Single Phase 3 Out(2LN-2LN). "In" means in line type, "Out" means the load wiring type.

The followings introduces EM and DM wiring methods in those five scenarios.

1. Single Phase In-Single Phase Out(1LN-1LN)

The max tenant number is 18.Each tenant is single phase.

EM:

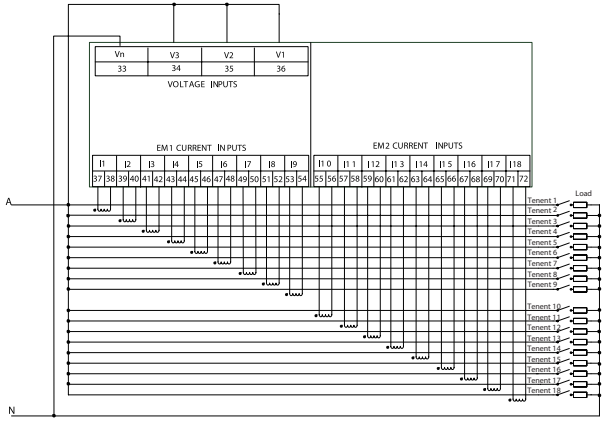


Figure 2-25 Single Phase In-Single Phase Out EM

DM:

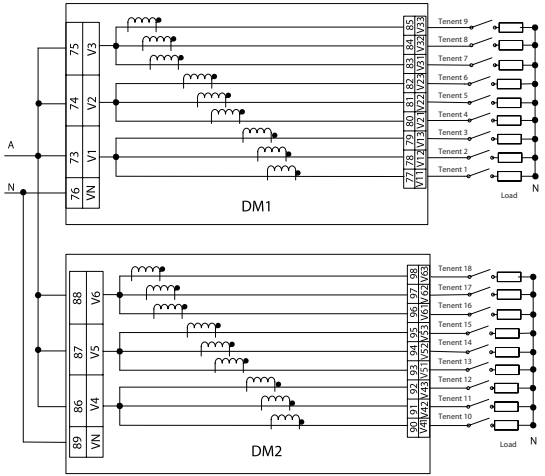


Figure 2-26 Single Phase In-Single Phase Out DM

2. Three Phase 4 In-Single Phase Out(3LN-1LN)

The maximum tenant number is 18, which needs setup.Each tenant is single phase. One phase of A, B, C goes through the current transformer. Users should refer to the wiring diagram to determine which phase each tenent should use. Incorrect wiring will result in incorrect measurement.

EM:

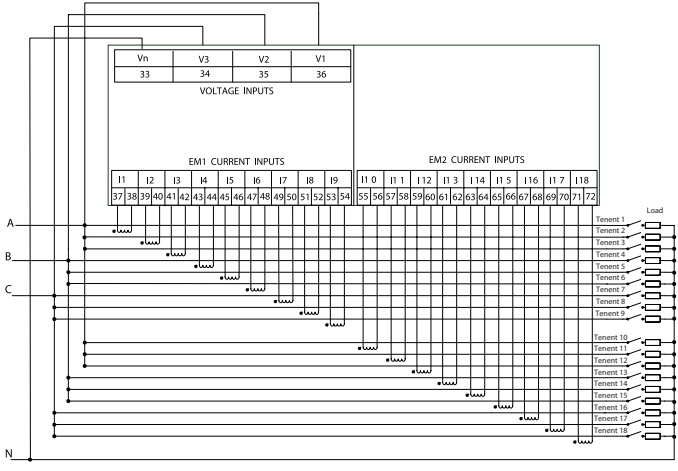


Figure 2-27 Three Phase 4 In-Single Phase Out EM

DM:

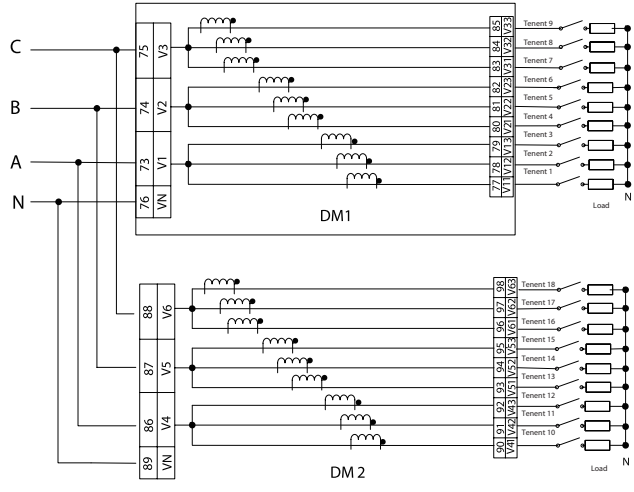


Figure 2-28 Three Phase 4 In-Single Phase Out DM

3. Three Phase 4 In-Three Phase 4 Out (3LN-3LN)

The maximum tenant number is 6, which needs setup.

Wiring method should be the same as Three Phase 4 In-Single Phase Out (3LN-1LN). The difference is each tenant has A, B, C three phase voltage and three phase current.

Three phase current of each tenant is:

	Tenant 1	Tenant 2	Tenant 3	Tenant 4	Tenant 5	Tenant 6
Phase A	I1	I2	I3	I10	I11	I12
Phase B	I4	I5	I6	I13	I14	I15
Phase C	I7	I8	I9	I16	I17	I18

Table 2-2 Three Phase 4 In-Three Phase 4 Out current

EM:

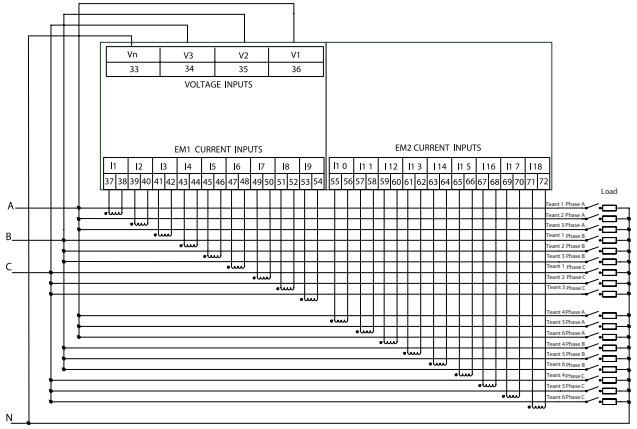


Figure 2-29 Three Phase 4 In-4 Out EM

DM:

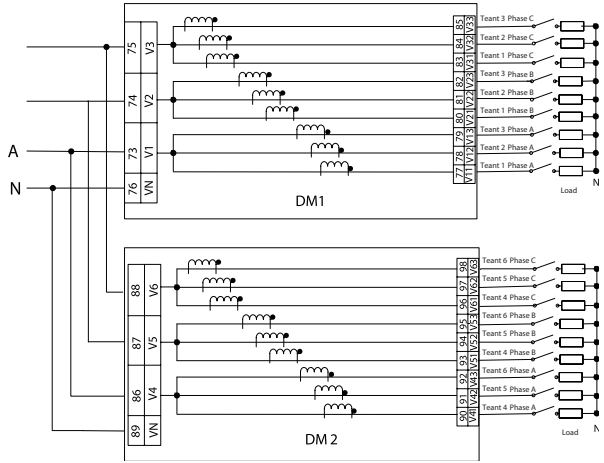


Figure 2-30 Three Phase 4 In-Three Phase 4 Out DM

4. Three Phase 3 In-Three Phase 3 Out(3LL-3LL)

The maximum tenant is 6, which needs setup.

Each tenant voltage is line voltage. The current form is the same as Three Phase 4 In-Three Phase 4 Out.

Please note Vn is open.

EM:

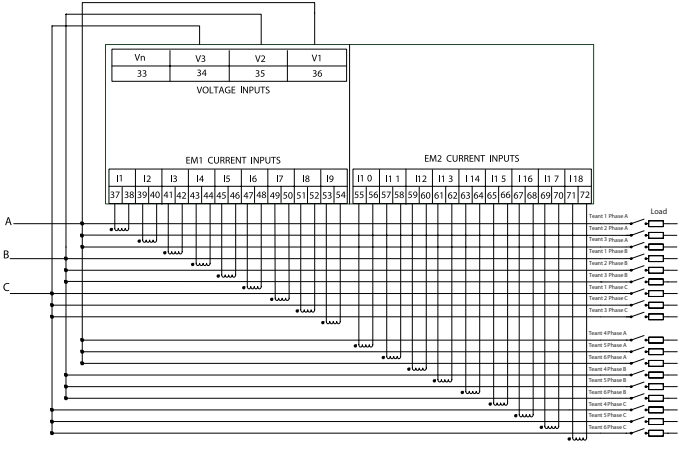


Figure 2-31 Three Phase 3 In-Three Phase 3 Out EM

DM:

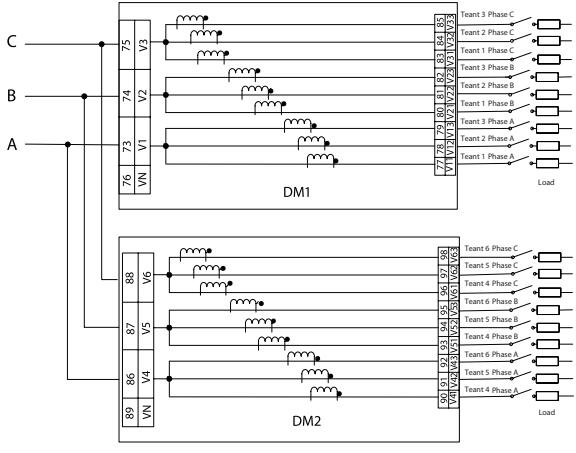


Figure 2-32 Three Phase 3 In-Three Phase Out DM

5. Single Phase 3 In-Single Phase 3 Out(2LN-2LN)

The maximum tenant number is 6, which needs setup.

Each tenant only has phase A and phase B, no phase C.

EM:

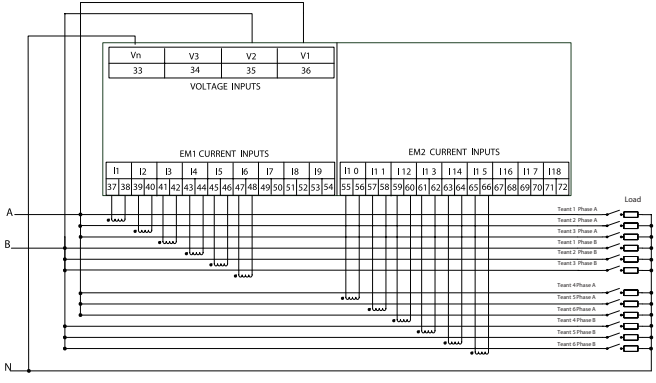


Figure 2-33 Single Phase 3 In-Single Phase 3 Out EM

DM:

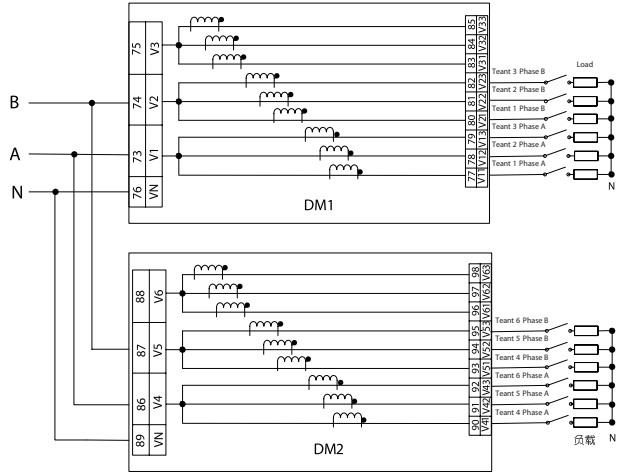


Figure 2-34 Single Phase 3 In-Single Phase 3 Out DM

Communication

AcuRev 2000 communication utilizes RS485 port, via Modbus-RTU protocol. The wiring terminals are A, B, S(1, 2, 3). "A" is called differential signal "+", "B" is called differential signal"-", "S" is connected to the shielding of shielded twisted pair cable. The maximum distance of Shielded Twisted Pair cable is 1200 m. The distance will be shorter if more devices are on the same communication link or using a higher baud rate.

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

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

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

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

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

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

5.Keep communication cables away as much as possible from sources of electrical noise.

When several devices are connected (daisy chain) to the same long communication line, an anti signal refecting resistor (typical value 120O- 3000Ohm, 0.25W) is often used at the end of the circuit (the last meter of the chain) if the communication quality is distorted.

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

7. A infrared port is also available in the Display Module, which supports meter reading. AcuRev 2000 also supports 10/100M Ethernet (optional), its protocol is Modbus TCP, SMTP, HTTP.

Chapter 3 Meter Display and Operation

3.1 Display Panel and Keys

3.2 Energy Display and Operation

3.3 Demand Display and Operation

3.4 I/O Display and Operation

3.5 Parameter Settings

3.6 Shortcut Code

3.7 Real-time Parameters

3.8 Device Information

3.1 Meter Display and Operation

Chapter 2.1 shows the dimensions of Display Module. It consists of one LCD screen and five keys.

AcuRev 2000 innovative Display Module can be integrated into the meter base or the display module can also be mounted on the panel.

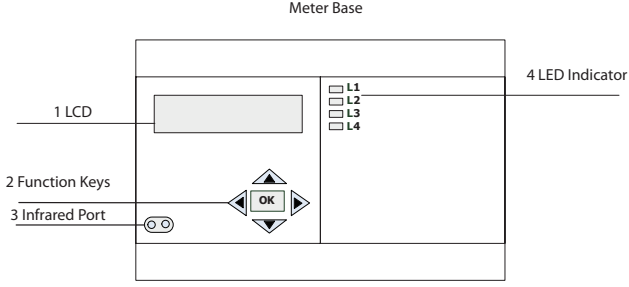


Figure 3-1 Display Module and LED Indicator

Function Keys:

Key		Function
▲	Up	Scroll up or increase value(Editing mode)
▼	Down	Scroll down or decrease value(Editing mode)
◀	Left	Decrease tenant number or move cursor to the left
▶	Right	Increase tenant number or move cursor to the Right
OK	Confirm	Show menu or confirmation

Table 3-1 Function Keys illustration

Key Combination

Holding "Left" and "right" at the same time is quick exit function, it will exit current screen and enter to the previous display screen.

Display Mode

Display energy when powered up.

1. Press "Left" and "Right" to switch tenant, "Up" and "Down" to swtich contents.

2. Press "OK" to display menu.

In the menu, "Up" "Down" "Left" "Right" are for moving cursor, "OK" for confirmation.In the editing mode, "Left" and "Right" are for moving cursor, "Up" and "Down" to change the value, "OK" for confirmation.

Settings Mode

In the menu screen, move the cursor to the settings icon, press "OK" to enter the settings mode. After the password screen, it will display address setting screen. Press "OK" to activate the cursor. When the cursor is inactive, "Left" and "Right" key do not work, "Up"

and "Down" to scroll the screens; when the cursor is active, "Up" and "Down" to change the value where the cursor stays, "Left" and "Right" to move the cursor, "OK" is for confirmation.

LED indicator from top to bottom:

L1- Power Supply. Remains on when the meter is powered. Turns off when meter is not powered.

L2- Pulse Output 1.Blinking: E1 Pulse Ouput; Non-BlinkingL: no Pulse Output.

L3- Pulse Output 2.Blinking: E2 Pulse Output; Non-Blinking: no Pulse Output.

L4- Alarming. Blinking: when an alarm is triggered; Non-Blinking: no alarms.

Main menu first screen

Menu Display	Function
E	Energy Measurement
D	Demand Measurement
IO	Digital Input Output
SET	Parameter Settings
M	Obtain Cursor

Table 3-2 Main menu first screen

Main menu second screen (AcuRev 2010 does not have PQ)

Menu Display	Function
MUL	Real-time
PQ	Harmonic
I	Device Information

Table 3-3 Main menu second screen

When the meter is powered, the screen displays version information. Then it goes directly to energy display. Press "OK" to display menu's first screen. Pressing "Up" or "Down" key on the menu's first screen will enter the second screen.

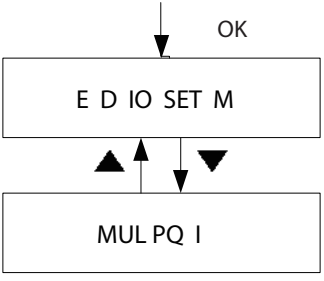


Table 3-2 Menu display

3.2 Energy Display and operation

On the first screen of main menu, select "E" by pressing "Left" and "Right", press "OK" to display energy. Press "Left" or "Right" to choose tenant and in line energy, each tenant has maximum 38 screens. Press "Up" and "Down" to select different screens. Different wiring methods lead to different screen numbers.

If TOU energy is not used, it only displays real-time energy.

Parameter	Screen Number
Real-time energy	E
This Month Tariff 1 Energy	M1
This Month Tariff 2 Energy	M2
This Month Tariff 3 Energy	M3
This Month Tariff 4 Energy	M4
This Month Total Energy	Mn
Prior Month Tariff 1 Energy	U1
Prior Month Tariff 2 Energy	U2
Prior Month Tariff 3 Energy	U3
Prior Month Tariff 4 Energy	U4
Prior Month Total Energy	Un

Table 3-4 Energy Display

Different wiring methods correspond to different display contents:

1. Single Phase In-Single Phase Out(1IN-1OUT)

Tenant numebr: 1-18(according to the preset value). The external inline preset figure should be plus 1.Press "Left" or "Right" to switch tenants.

The display tenants maximum number is 5.(Only real-time energy will be displayed if there is no TOU energy available).

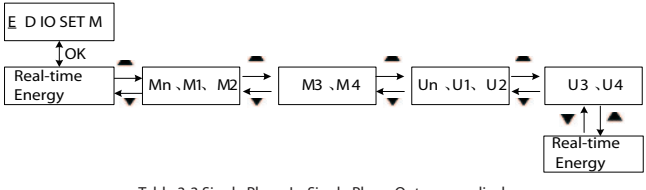


Table 3-3 Single Phase In-Single Phase Out energy display

2. Three Phase 4 In-Single Phase Out(3LN-1OUT)

Tenant number: 1-18(according to the preset value), plus in line A, B, C and three in line total energy. The total setting value is 4.

The maximum screen each tenant has is 5 (only real-time energy is displayed TOU energy unavaible), the same as Single Phase In-Single Phase Out.

3. Three Phase 4 In-Three Phase 3 Out(3LN-3LN)

Tenant number: 1-6(according to the preset vaule), plus in line total energy, the total setting value is 1.Press "Left" and "Right" to switch tenants. The maximum screen number each tenant has is 17 (no TOU energy, only real-time energy). The minimum screen number is 2.

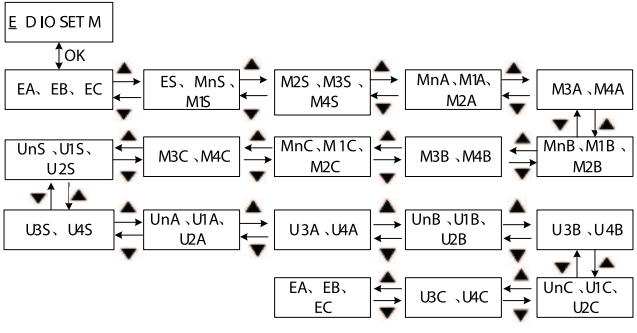


Figure 3-4 Three Phase 4 In-Three Phase 4 Out energy display

4. Three Phase 3 In-Three Phase 3 Out (3LL-3LL)

Tenant number: 1-6(according to the preset vaule), plus in line total energy, the total setting number is 1.Press "Left" and "Right" to switch tenants.

The maximum screen number each tenant has is 5 (no TOU energy, only real-time energy)-----the same as Single Phase In-Single Phase Out, but energy is total energy, not single phase energy.

5. Single Phase 3 In-Single Phase 3 Out(2LN-2LN)

Tenant number: 1-6(According to the preset value), plus in line energy, the total setting number is 1.Press "Left" and "Right" to switch tenants.

The maximum screen number each tenant has is 13.(no TOU energy, only real-time energy)

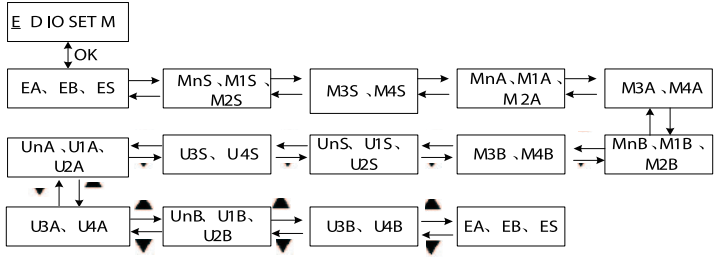


Figure 3-5 Single Phase 3 In-Single Phase 3 Out energy display

3.3 Demand Display and Operation

On the first page of the main menu, press "left" and "right" to choose "D", then press the center key, the meter displays demands. Demand Code is 2.

Parameter	Display
Real Power Demand	D
Real Power Demand Prediction	P
Real Power Demand Max	M

Table 3-5 Parameter display

Different wiring methods lead to different display screens. The display screens are as follows:

1. Single Phase In-Single Phase Out(1LN-1LN)

Tenant Number: 1-18(according to the preset value). The external inline preset figure should be plus 1.Press "Left" or "Right" to switch tenants. Press "Left" or "Right" to switch tenants.

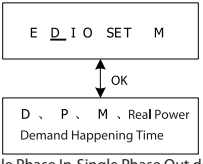


Figure 3-6 Single Phase In-Single Phase Out demand display

2. Three Phase 4 In-Single Phase Out(3LN-1LN)

Tenant Number: 1-18(according to the preset value), plus in line A, B, C, the total setting number is 4.

The display is the same as Single Phase In Single Phase Out.

3. Three Phase 4 In-Three Phase 4 Out(3LN-3LN)

Tenant Number: 1-6(according to the preset value), plus 1 as in line total energy. Press "Left" or "Right" to switch tenants. The maximum screen number each tenant has is 4.

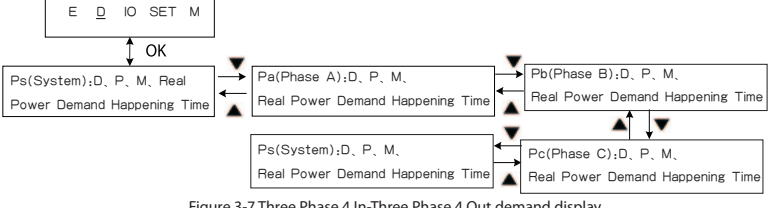


Figure 3-7 Three Phase 4 In-Three Phase 4 Out demand display

4. Three Phase 3 In-Three Phase 3 Out(3LL-3LL)

Tenant Number: 1-6(according to the preset value), plus 1 as in line total energy.

The screen is the same as Sinle Phase In-Single Phase Out's, but the power demand is the total, not for each phase.

5. Single Phase 3 In-Single Phase 3 Out(2LN-2LN)

Tenant Number: 1-6(according to the preset value), plus 1 as in line total energy. Press "Left" and "Right" to switch tenants. The maximum screen number each tenant has is 3.

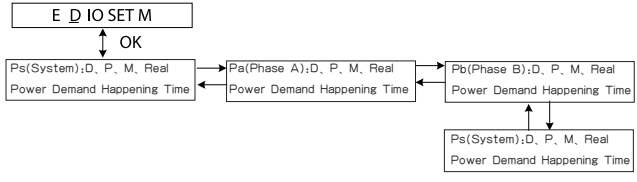


Figure 3-8 Single Phase 3 In-Single Phase 3 Out demand display

3.4 IO Display and Operations

On the first page of the main menu, press "left" and "right" to choose "IO", then press the center key, the meter displays demands. Press "Up" and "Down" to switch screens.

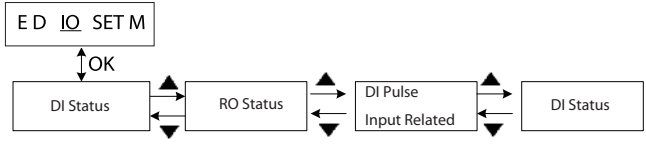


Figure 3-9 IO Display

1st screen, DI status, 8-channel DI

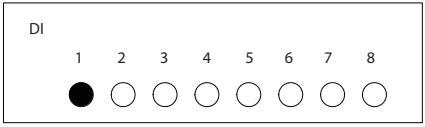
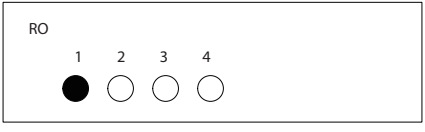


Figure 3-10 DI Display

○ indicates this channel DI status "OFF" or Pulse Input

● indicates DI status"ON"

2nd screen, RO status, 4-channel RO



○ indicates this channel RO status "OFF"

● indicates this RO status "ON"

Figure 3-11 RO Display

3rd screen, DI pulse input number and its parameter, press "Left" and "Right" to select different channel 1-8.

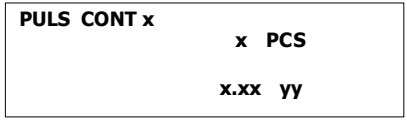


Figure 3-12 DI Pulse Input Display

CONT X indicates DI channel number

PCS indicates pulse number

yy indicates number, such as 6.15 m3 represents 6.15 m3

3.5 Parameter Settings

On the first screen of the main menu, press "Left" and "Right" to choose "SET", press the center key to display settings. There are 38 screens, which the user can change settings via "Up" and "Down" keys.

Parameters can be also changed via software.

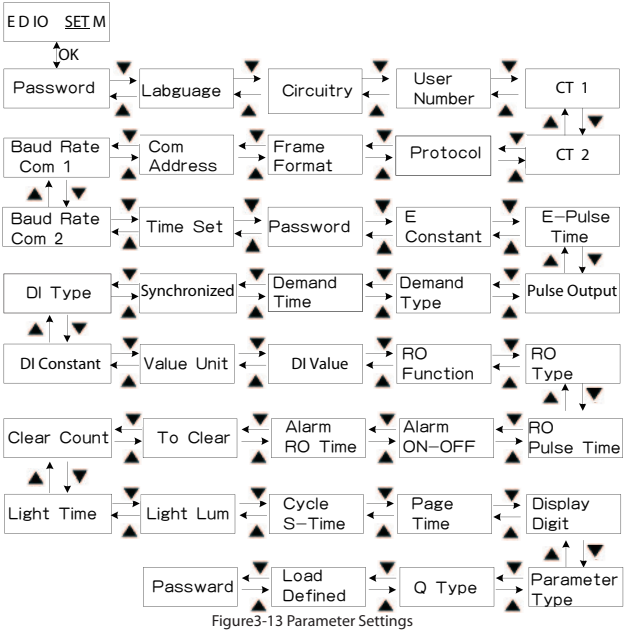


Figure3-13 Parameter Settings

Baud Rate 1 refers to the RS485 communication between the meter and the software. Frame Format also refers to this communication link. Baud Rate 2 refers to the infrared communication. DI Constant means how many pulse inputs equals one count. DI Unit means DI parameter unit, 5 categories, t/m^3/kWh/$ respectively. DI Value means the parameter the pulse reprents. Light Time means how long the backlight stays on. Cycle S-Time means how long it elapses until the meter goes into the cycling display mode.

Note: pressing "Left" and "Right" keys will exit the parameter settings mode.

3.6 Shortcut Code

On the first screen of main page, press "Left" and "Right" keys to choose "M", then press the center key to enter Shortcut Keys page.

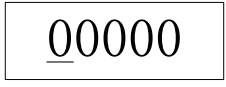


Figure 3-14 Shortcut Keys Display

Press "Left" and "Right" to move the cursor to choose different digit. Press "Up" and "Down" key to change the digit value, after the input of Shortcut Code, press the center key to enter the corresponding pages.

Shortcut Code consists of five digits. The first digit on the left is to choose functions, as depicted in Table 3-6.1 represents energy measurement, 2 represents demand measurement, 3 represents real-time, 4 represents Digital Input Digital Output, all the other parameters do not have shorcut code.

For example, "10101" represents energy measurement display, the 1st screen, the 1st tenant; "20210" represents demand measurement display, the 2nd screen, the 10th tenant.

If the teant number exceeds the current set tenant number, it will display the 1st tenant; if the screen number exceeds the actual number, it will display the 1st screen.

Function	Shortcut Key
Energy Measurement	1
Demand Measurement	2
Real-time	3
Digital Input Digital Output	4

Table 3-6 Shortcut Key

1 Single Phase In-Single Phase Out(1LN-1LN)

Function	Tenant	Screen Number	Code	Content
Energy (No Time of Use, only real-time energy)	1-18	1	10101-10118	Real-time energy
		2	10201-10218	This month total energy, this month tariff 1 energy, this month tariff 2 energy.
		3	10301-10318	This month tariff 3 energy, this month tariff 4 energy.
		4	10401-10418	This month total energy, this month tariff 1 energy, prior month tariff 2 energy.
		5	10501-10518	Prior month tariff 3 energy, Prior month tariff 4 energy
Demand	1-18	1	20101-20118	Real Power Demand, Real Power Demand prediction, Real Power Demand Peak
Real-time	1-18	1	30101-30118	Real Power
Digital Input and Digital Output	DI Channel 1-8	1	40101-40108	DI Status
		2	40201-40208	RO Status
		3	40301-40308	DI Pulse Input related

2 Three Phase 4 In-Single Phase Out(3LN-1LN)

Function	Tenant	Screen Number	Code	Content
Energy (No Time of Use, only real-time energy)	1-18	1	10101-10118	Real-time energy
		2	10201-10218	This month energy, this month tariff 1 energy, this month tariff 2 energy
		3	10301-10318	This month tariff 3 energy, this month tariff 4 energy
		4	10401-10418	This month energy, prior month tariff 1 energy, prior month tariff 2 energy
		5	10501-10518	Prior month tariff 3 energy, prior month tariff 4 energy
Demand	1-18	1	20101-20118	Real Power Demand, Real Power Demand prediction, Real Power Demand Peak
Real-time	1-18	1	30101-30118	Real Power
Digital Input Digitan Output	DI Channel 1~8	1	40101-40108	DI Status
		2	40201-40208	RO Status
		3	40301-40308	DI Pulse Input related

3 Three Phase 4 In-Three Phase 4 Out(3LN-3LN)

Function	Tenant	Screen Number	Code	Content
Energy (No Time of Use, only real-time energy)	1-6	1	10101-10106	Phase A, B, C energy
		2	10201-10206	Inline energy, inline this month energy, inline this month traiff 1 energy.
		3	10301-10306	Inline this month tariff 1 energy, inline this month tariff 2 energy, inline this month tariff 3 energy
		4	10401-10406	Phase A this month total energy, Phase A this month traiff 1 energy, Phase A this month traiff 2 energy.
		5	10501-10506	Phase A this month tariff 3 energy, Phase A this month tariff 4 energy
		6	10601-10606	Phase B this month total energy, Phase B this month tariff 1 energy, Phase B this month tariff 2 energy
		7	10701-10706	Phase B this month tariff 3 energy, Phase B this month tariff 4 energy
		8	10801-10806	Phase C this month total energy, Phase C this month tariff 1 energy, Phase C this month tariff 2 energy.
		9	10901-10906	Phase C this month tariff 3 energy, Phase C this month tariff 4 energy.
		10	11001-11006	Inline prior month total energy, inline prior month tariff 1 energy, inline prior month tariff 2 energy
		11	11101-11106	Inline prior month tariff 3 energy, Inline prior month tariff 4 energy
		12	11201-11206	Phase A prior month total energy, Phase A prior month tariff 1 energy, Phase A prior month tariff 2 energy
		13	11301-11306	Phase A prior month tariff 3 energy, Phase A prior month tariff 4 energy
		14	11401-11406	Phase B prior month total energy, Phase B prior month tariff 1 energy, Phase B prior month tariff 2 energy
		15	11501-11506	Phase B prior month tariff 3 energy, Phase B prior month tariff 4 energy
		16	11601-11606	Phase C prior month total energy, Phase C prior month tariff 1 energy, Phase C prior month tariff 2 energy
		17	11701-11706	Phase C prior month tariff 3 energy, Phase C prior month tariff 4 energy

Function	Tenant	Screen Number	Code	Content
Demand	1-6	1	20101-20106	System Power Demand, System Power Demand prediction, System Power Demand Peak
		2	20201-20206	Phase A Power Demand, Power Demand Prediction, Power Demand Peak
		3	20301-20306	Phase B Power Demand, Power Demand Prediction, Power Demand Peak
		4	20401-20406	Phase C Power Demand, Power Demand Prediction, Power Demand Peak
Real-time	1-6	1	30101-30118	Power

4 Three Phase 3 In-3 Out(3LL-3LL)

Function	Tenant	Screen Number	Code	Content
Energy (No Time of Use, only real-time energy)	1-6	1	10101-10106	Real-time energy
		2	10201-10206	This month total energy, This month tariff 1 energy, This month tariff 2 energy
		3	10301-10306	This month tariff 3 energy, This month tariff 4 energy
		4	10401-10406	This month total energy, Prior month tariff 1 energy, Prior month tariff 2 energy
		5	10501-10506	Prior month tariff 3 energy, Prior month tariff 4 energy
Demand	1-6	1	20101-20106	Power Demand, Power Demand Predition, Power Demand Peak
Real-time	1-6	1	30101-30106	Real Power
Digital Input Digital Output	DI channel 1-8	1	40101-40108	DI Status
		2	40201-40208	RO Status
		3	40301-40308	DI Pulse Input related

5 Single Phase 3 In-Single Phase 3 Out(2LN-2LN)

Function	Tenant	Screen Number	Code	Content
Energy (No Time of Use, only real-time energy)	1-6	1	10101-10106	Phase A, B real-time energy, inline energy
		2	10201-10206	Inline this month total energy, Inline this month tariff 1 energy, Inline this month tariff 2 energy
		3	10301-10306	Inline this month tariff 3 energy, Inline this month tariff 4 energy
		4	10401-10406	Phase A this month total energy, Phase A this month tariff 1 energy, Phase A this month tariff 2 energy
		5	10501-10506	Phase A this month tariff 3 energy, Phase A this month tariff 4 energy
		6	10601-10606	Phase B This month total energy, Phase B This month tariff 1 energy, Phase B this month tariff 2 energy
		7	10701-10706	Phase B this month tariff 3 energy, Phase B this month tariff 4 energy
		8	10801-10806	Inline Prior month total energy, inline Prior month tariff 1 energy, inline Prior month tariff 2 energy
		9	10901-10906	Inline this month tariff 3 energy, Inline Prior month tariff 4 energy
		10	11001-11006	Phase A prior month energy, Phase A Prior month tariff 1 energy, Phase A Prior month tariff 2 energy
		11	11101-11106	Phase A Prior month tariff 3 energy, Phase A Prior month tariff 4 energy
		12	11201-11206	Phase B Prior month total energy, Phase B Prior month tariff 1 energy, Phase B prior month tariff 2 energy
		13	11301-11306	Phase B Prior month tariff 3 energy, Phase B Prior month tariff 4 energy
Demand	1-6	1	20101-20106	System Power Demand, System Power Demand Prediction, System Power Demand Peak
		2	20201-20206	Phase A Power Demand, Power Demand prediction, Power Demand Peak
			20301-20306	Phase B Power Demand, Power Demand prediction, Power Demand Peak
Real-time	1-6	1	30101-30118	Real Power
Digital Input Digital Output	DI channel 1-8	1	40101-40108	DI Status
		2	40201-40208	RO Status
			40301-40308	DI Pulse Input related

Table 3-7 Shortcut Code Index

3.7 Real-time Parameters

On the second page of the main menu, press "Left" or "Right" to choose "MUL", then press center key, it starts to display real-time parameters. Take Real Power for instance, press "Left""Right" or "Up" "Down" to choose different tenants and inline ABC settings. The detailed display contents depends on the wiring scenario.

Parameter	Display Symbol
Phase A Real Power	A
Phase B Real Power	B
Phase C Real Power	C
Total Real Power	S

Table 3-8 Real-time parameter settings

3.8 Device Information

On the second page of the main menu, press "Left" "Right" to choose "I", press center key, it starts to display device information. In total there are 4 screens.

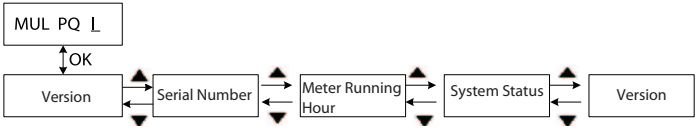


Figure 3-15 Device Information

Chapter 4 Functions and Software

4.1 Basic Parameter Functions

4.2 IO Functions

4.3 Demand

4.4 Energy

4.5 Sequence of Events(SOE)

4.6 Over/Under Limit Alarming

4.7 System Event

4.8 Trending Record

4.9 Device Information

This chapeter introduces AcuRev 2000 Utility Software.

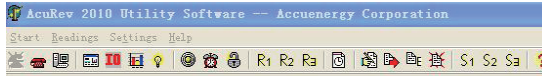


Figure 4-1 AcuRev 2000 Utility Software interface

General Settings must be configured properly in order to have AcuRev 2000 operate normally.

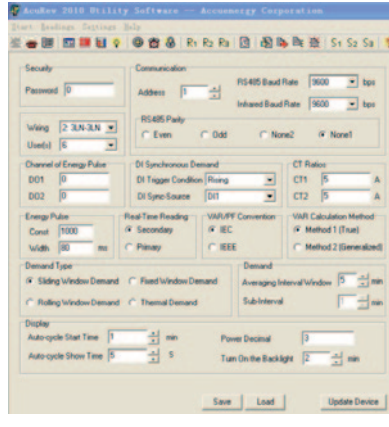


Figure 4-2 General Settings in the software

There are five wiring methods, listed below

	Wiring	Max Tenant Number
0: 1LN-1LN	Single Phase 1 In-1 Out	18
1: 3LN-1LN	Three Phase 4 In-Single Phase Out	18
2: 3LN-3LN	Three Phase 4 In-Three Phase 4 Out	6
3: 3LL-3LL	Three Phase 3 In-Three Phase 3 Out	6
4: 2LN-2LN	Single Phase 3 In-Single Phase 3 Out	6

Table 4-1 Wiring Method

Energy pulse output setting: energy pulse settings include Pulse Constant and Pulse Width. Pulse Constant's range is 500-20000, Pulse Width range is 20-100ms. In practical applications, Pulse Constant and Pulse Width should be set according to the system's real power, otherwise it will influence the system's energy accuracy.

Pulse Period = 3600000 /(Real Power x Pulse Constant)

Pulse Period > Pulse Width

The following equation must be fulfilled in order to ensure the energy accuracy, the unit of Real Power is kW, Pulse Width is ms.

3600000 /(Real Power x Pulse Constant)> Pulse Width

For example, if the Real Power is 35.2 kW, Pulse Width = 3600000 /(35.2 x Pulse Constant), it must meet 3600000 /(35.2 x Pulse Constant)>Pulse Width.

Note: after the setup, "Update Device" must be clicked in order to send the settings to the meter. All the other setting operations should follow this as well.

4.1 Basic Parameter Functions

The basic parameters measured in the AcuRev 2000 are voltage, current, power, etc. Th e base module only displays power, including sytem power, inline A, B, C power, and each tenant's power. Different wiring methods lead to different displays. The following figure is the display of baisc parameter measurement (take 3LN-3LN wiring for instance).

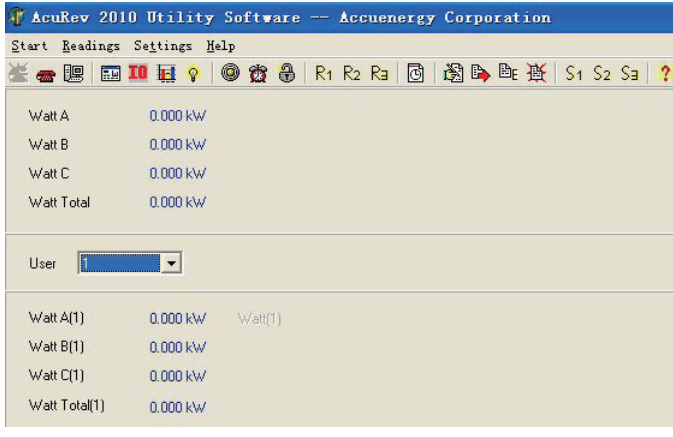


Figure 4-3 Basic Measurment Parameter Display

Note: the "tenant number" above is optional, users choose the tenant to display (1-6). The tenant number divides the screen into two parts: the upper part is the inline power, the lower part is the tenant power. When wiring is set as Three Phase 4 In-Three Phase 4 Out, the right part with single phase tenant power will be greyed out.In the upper display, Pa represents Phase A Power; In the lower display, Pa (N) represents the N-th tenant's Phase A power. The power accuracy is 1 %, with 4 decimal places.

4.2 IO Functions

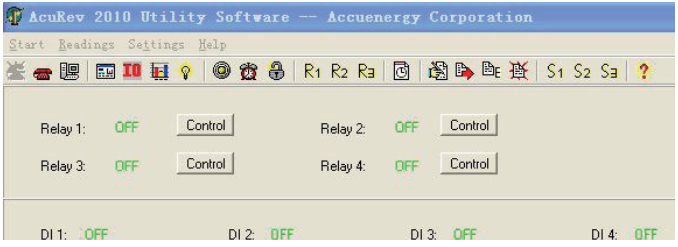


Figure 4-4 DI/RO

As Figure 4-4 shows, AcuRev 2000 has 4 Relay Outputs (RO), 8 Digital Inputs (DO). Please refer to Figure 4-5 for DI/RO related settings.

RO

Each channel RO can be configured as Relay Control or Alarm Output.

(1)Relay Control: Latching or Pulse; Pulse width can be set between 50 and 3000 ms.

(2)Alarm Output

There are two Alarm Output types: Over/Under Limit Alarming and System Event Alarming, the two can be active at the same time. Over/Under Limit Alarming will be introduced in detail later.

There are 12 events for system event alarming, which are:

1. Reset

2. Demand DI Synchronization

3. Demand Command Synchronization

4. Energy Clear

5. Running Hour Clear

6. Battery Runtime Clear

7. System Parameter Change

8. Initialized Energy Set

9. TOU Energy Change

10. System Clock Change

11. Reversed Power Direction

12. DI Pulse Counter Clear

These 12 events can enable the output of Relay 1 to Relay 4 for alarming. The time delay for alarming signal is 1-60000 s (the Relay Output status will latch for that amount of time).

If the Relay Output type is set as Relay Control, click "Control" in Figure 4-4 to send command "close" or "open" to the relay. When the relay is set as alarming output, Relay Control function will be disabled.

DI Function

DI type: Signal Status; Pulse Counter

DI unit and category: s (seooncd), m3 (cubic meters), kWh (energy), RMB (Renminbi), $ (dollar).

When DI type is set as Signal Status, it monitors the input status, providing all DI status. High level displays as "ON", low level displays as "OFF".

When DI type is set as Pulse Counter, it counts the input pulses. The Pulse Counter settings include Pulse Constant (how many pulses equals one count), Category amd Unit, Value

(Category multiplied with the count number). The display panel displays the number corresponding to the pulse, as well as the calculated value.

For instance, if set 10 pulses = one count, one count represents 5 kWh. When 100 pulses are input, the display panel will display Number = 100/10=10, 10*5=50 kWh.

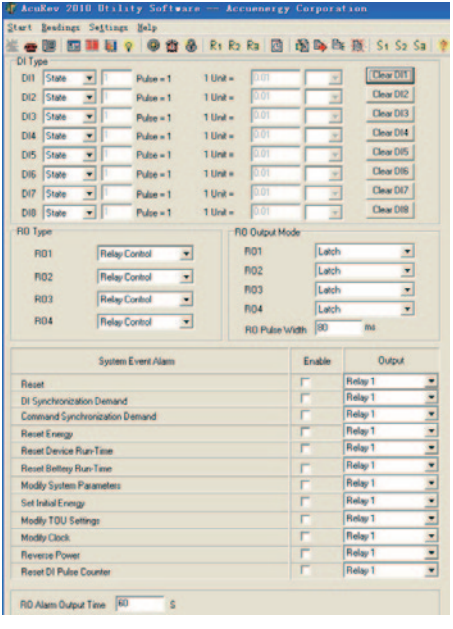


Figure 4-5 DI/RO and System Event alarming setup

DO Function

Pulse Output DO has 4 channels.

2-channel energy pulse output, the two channel can be used to send out independant energy pulses (see Appendix B), Pulse Constant, Pulse Width can be set. Tenant Number, Pulse Constant and Pulse Width settings can be implemented as Figure 4-2 shows.

1 channel demand cycle pulse output.

1 channel second pulse output is used to check the system clock's accuracy, or used to be the benchmark of time for the other equipment.

4.3 Demand

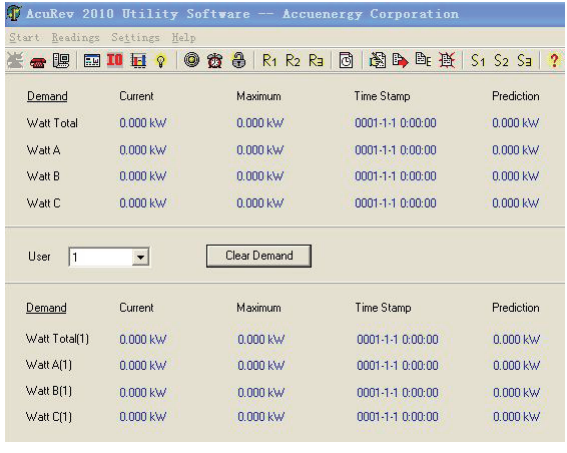


Figure 4-6 Demand

Display Demand, Max Demand, Max Demand Time, Demand Prediction (update per second) of the real power. The tenant number is selective. The tenant number divides the software window into two parts, the upper part indicates the demand related parameters, the lower part indicates the demand of each individual tenant.

Demand calculation has four methods: Sliding Window method, Fixed Window method, Rolling Window method and Thermal method. Users can set the demand period (1-30 minutes)and secondary demand period (1-30 minutes)according to different calculation methods. All related settings can be found in Figure 4-2.

Support Demand Synchronization

Method: Synchronizing with DI; Synchronizing with Command

DI Synchronization: DI triggering can be chosen as no triggering, triggered by rising edge, triggered by falling edge, triggered by changes. DI Synchronization source can set as DI1-DI8.The Synchronizing with DI settings is in Figure 4-2.

The Synchronizing with Command: choose "Clear Demand" in Figure 4-6.

Demand cycle or secondary cycle finishing signal can be sent out by DO.

4.4 Energy

Time of Use bi-directional real energy measurement. It saves up to 2 months energy data, data saving boundary time can be any specified day (auto meter reading day) between 1 and 28.The factory default is at 0 o'clock the first day of each month.

Figure 4-7 Energy

Displays real-time energy, this month TOU energy, prior month TOU energy, individual tenant real-time energy, this month individual tenant TOU energy, prior month individual tenant energy, Critial-peak, On-peak, Mid-peak, Off-peak energy reading. If TOU energy measurement is not enabled, it displays real-time energy only.

The tenant number divides the screen into two parts, the upper part indicates inline energy parameters, the lower part indicates the individual tenant energy parameters.

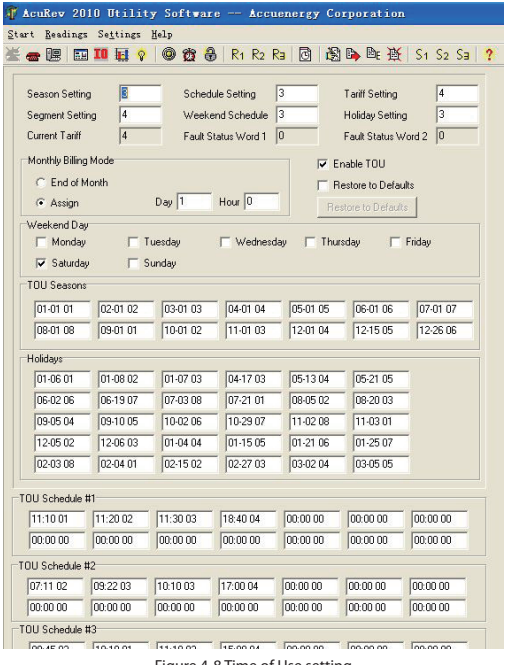


Figure 4-8 Time of Use setting

TOU energy settings are in Figure 4-8.

Season: the maximum season number is 14.If the season number is smaller than the programmed season number, the energy meter only utilizes the first seasons (for instance, if the season number is 2, it only runs the first 2 seasons).

Schedule: the maximum schedule number is 8.If the schedule number is set as 3, the 4th to the 14th schedules will be unavailable.

Segment: the maximum segment number is 14.If the segment is set as 4, the 5th to the 14th segments will be unavailable. Only the first 4 segments are available.

Tariff: the maximum tariff number is 4.If tariff number in the schedule is larger than the set tariff number or equals 0, the energy in this schedule will be using tariff 1.

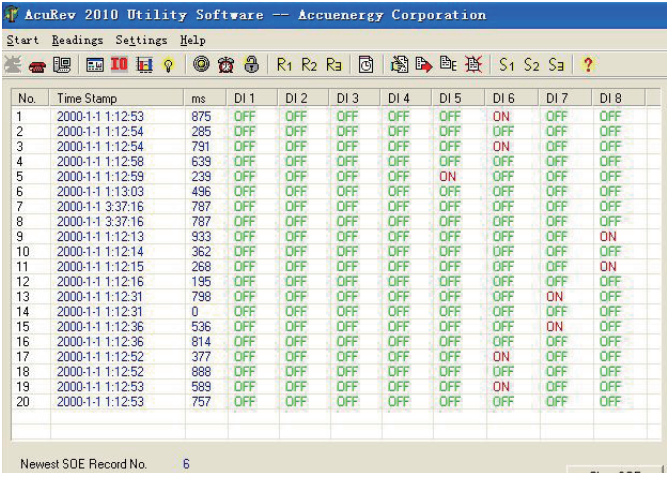
Weekend: setup the schedule number according to weekends.

Holiday: the maximum holiday number is 30.If it is set as 0, it indicates public holiday disabled. For instance, public holidays, such as January 1, December 25th, which users can set. Public holidays and their schedule number can be configured as different public holidays by using different schedule numbers.

Note: if the public holiday and weekend schedule number is set as 0, it means these public holidays are unavailable. If the weekend and public holidays are overlapped, the public holiday overrides the weekend setting, holiday has the higher priority.

Parameter Settings: changing tariff settings will do an auto check. If there is an error found, it will send out an alert and an error message status. In the error state all tariffs should follow tariff 1, until the status is corrected. Season and Schedule settings must be continous, the starting time of the 2nd season is the ending time of the 1st season, the same rule applies to the rest.

4.5 Sequence of Events(SOE)



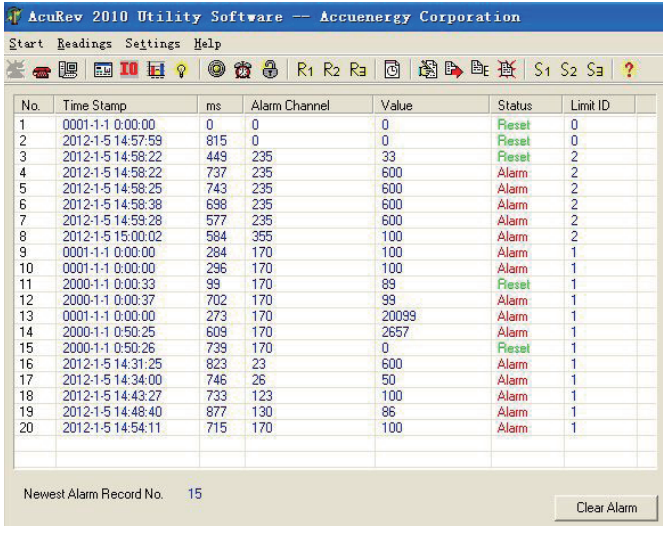
No.	Time Stamp	ms	DI 1	DI 2	DI 3	DI 4	DI 5	DI 6	DI 7	DI 8
1	2000-1-1 1:12:53	875	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
2	2000-1-1 1:12:54	285	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
3	2000-1-1 1:12:54	791	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
4	2000-1-1 1:12:58	639	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
5	2000-1-1 1:12:59	239	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF
6	2000-1-1 1:13:03	496	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
7	2000-1-1 3:37:16	787	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
8	2000-1-1 3:37:16	787	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
9	2000-1-1 1:12:13	933	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
10	2000-1-1 1:12:14	362	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
11	2000-1-1 1:12:15	268	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON
12	2000-1-1 1:12:16	195	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
13	2000-1-1 1:12:31	798	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
14	2000-1-1 1:12:31	0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
15	2000-1-1 1:12:36	536	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
16	2000-1-1 1:12:36	814	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
17	2000-1-1 1:12:52	377	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
18	2000-1-1 1:12:52	888	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
19	2000-1-1 1:12:53	589	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF
20	2000-1-1 1:12:53	757	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF

Figure 4-9 SOE in software

When DI is used as remote signal detection, it will record SOE. SOE is when DI circuits detect the change of the signal voltage level, it records the channel , the event and the event's timestamp.

The SOE records DI1-DI8 input status change and its time, it allows up to 20 events. The newest event number can be displayed.

4.6 Over/Under Limit Alarming



No.	Time Stamp	ms	Alarm Channel	Value	Status	Limit ID
1	0001-1-1 0:00:00	0	0	0	Reset	0
2	2012-1-5 14:57:59	815	0	0	Reset	0
3	2012-1-5 14:58:22	449	235	33	Reset	2
4	2012-1-5 14:58:22	737	235	600	Alarm	2
5	2012-1-5 14:58:25	743	235	600	Alarm	2
6	2012-1-5 14:58:38	698	235	600	Alarm	2
7	2012-1-5 14:59:28	577	235	600	Alarm	2
8	2012-1-5 15:00:02	584	355	100	Alarm	2
9	0001-1-1 0:00:00	284	170	100	Alarm	1
10	0001-1-1 0:00:00	296	170	100	Alarm	1
11	2000-1-1 0:00:33	99	170	89	Reset	1
12	2000-1-1 0:00:37	702	170	99	Alarm	1
13	0001-1-1 0:00:00	273	170	20099	Alarm	1
14	2000-1-1 0:50:25	609	170	2657	Alarm	1
15	2000-1-1 0:50:26	739	170	0	Reset	1
16	2012-1-5 14:31:25	823	23	600	Alarm	1
17	2012-1-5 14:34:00	746	26	50	Alarm	1
18	2012-1-5 14:43:27	733	123	100	Alarm	1
19	2012-1-5 14:48:40	877	130	86	Alarm	1
20	2012-1-5 14:54:11	715	170	100	Alarm	1

Figure 4-10 Alarming in software

Alarming records alarming timestamp, alarming parameter, over/under limit value, alarming status and alarming condition. Users can setup alarming conditions in "Alarm Setup". The maximum alarming record is 20.

Note: The alarming threshold value is not a real measured value, it is the percetage of real measured value over rated value. For instance, if the rated value is 1100, the displayed threshold is 40, then real value = rated value x percentage = 1100×40% = 440.

Please refer to Figure 4-11 for detailed setup.

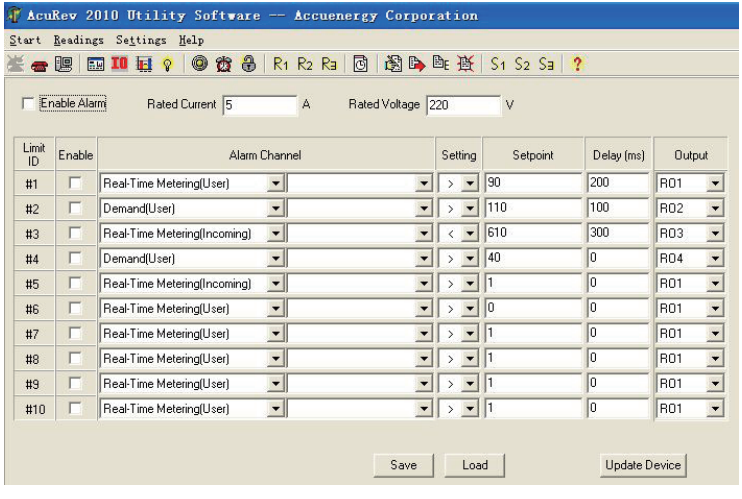


Figure 4-11 Alarming Setup

Set up alarming rule, including alarming parameter, alarming condition, alarming target, delay time (ms) and alarming output.

Energy and alarm switch can be set at the same time. Current rating and voltage rating are the load's current and voltage ratings.

The maximum alarming condition can be set as 10.

Alarming parameters includes inline basic parameter, tenant basic parameter, inline demand and tenant demand.

Inline basic parameters: system real power; real power Pa; real power Pb; real power Pc.

Tenant Basic parameters: system real power; real power Pa; real power Pb; real power Pc.

Inline demand: system real power; system real power demand prediction; system power demand Pa; power demand Pa prediction; system power demand Pb; system power demand Pb prediction; system power demand Pc; system power demand Pc prediction

Tenant Demand: System Power; real power demand Pa; real power demand Pa prediction; real power demand Pb; real power demand Pb prediction; real power demand Pc; real power demand Pc prediction.

Condition: >(larger than); =(equal) ; <(smaller than).

Alarming setpoint: alarming setpoint is expressed by the percentage of rated value.

For instance: voltage rating is 220 V, current rating 5 A, now it requires alarms when the 1st tenant's real power is larger than 3 kW. Since rated power is 1.1 kW, 3kW is 1.1kW 273%, then set alarming setpoint as 273.

Time Delay: 0-30000 ms

Output: No output; one of RO1-RO4.

4.7 System Event Log

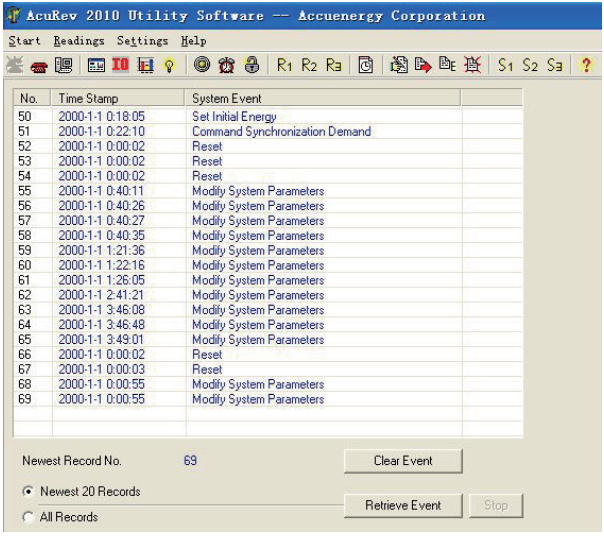


Figure 4-12 System Event Log

Logs system event date and type. Please refer to the 12 system events in 4.2.The max record number is 100.It can be chosen as "the newest 20 records" or "all records".

4.8 Trending Record

In order to have the user understand meter's history, the meter provides trending record function, which is logging a group of data with a preset time interval. AcuRev 2000 has 4 MB of memory, which is used for logging the historic trending. The meter has a system clock therefore, all of the trending records have a timestamp when they are created.

Trending Record Setup

AcuRev 2000 has 3 trending logs, each log can be programmed individually. Different contents can be added into 3 logs. Each log slot can be added up to 117 parameters. The memory size of the 3 logs can als obe configured, however, the total sector number of the 3 logs cannot be over 60 (each sector has 64 kB, approximate 64 sectors compose 4MB). Trending log #1 configuration page can be found in Figure 4-13.

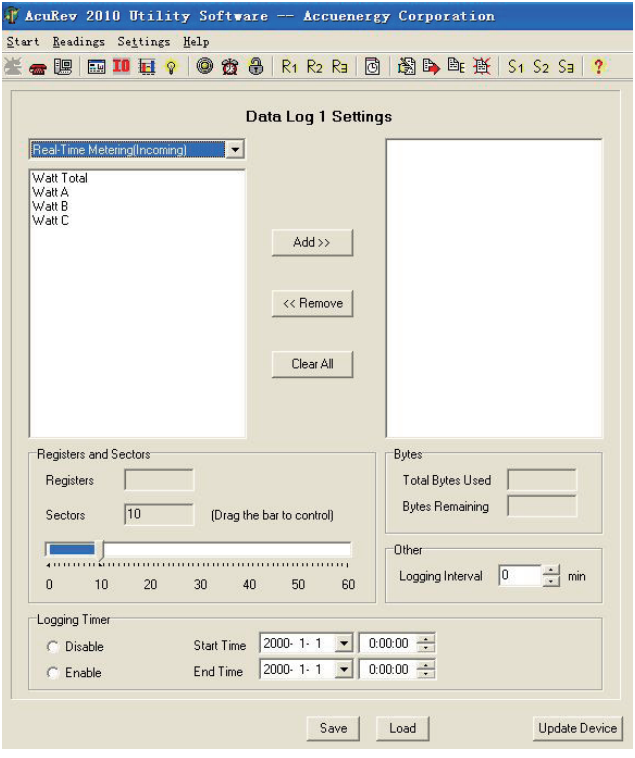


Figure 4-13 Trending Log #1 Configuration

Different contents can be added into 3 logs to meet users' requirements. For example, log #1 can be configured as basic parameter measurement (such as Power), log #2 can be configured as energy measurement, log # 3 can be configured as demand measurement. log # can be choose from 8 categories:

1. Real-Time Metering(Incoming),

2. Real-Time Metering(User),

3. Demand(Incoming),

4. Demand(User),

5. Energy(Real-Time Incoming),

6. Energy(Current Month TOU-Incoming),

7. Energy(Prior Month TOU-Incoming),

8. Energy(Real Time-User)

Inline real-time parameters:

Users can set different parameters from the 8 categories. Generally, one trending record needs the following settings:

1)8 categories;

2)Choose Parameters:

a. Select the interested parameters from the left column.

b. Press "Add" button, the selected parameters will be added to the right column.

c. If a parameter needs to be removed, select the parameter in the right column, click "Remove" to deselect it.

3)Set logging interval:

The logging interval can be set as any integer between 0-1440.It is how often a record will be logged. When it is set as 0, the logging feature is disabled.

4)Log sector size setup:

The log sector size can be selected between 0 and 60.Make sure the total sector number of the 3 logs does not exceed 60.

5)If Logging Timer is enabled, a record will be logged at the preset logging interval between Start Time and End Time of Logging Timer.

Note:

• If Logging Timer is enabled, when the memory is full, no more records will be logged. If Logging Timer is disabled, when the memory is full, the meter keeps logging, the earlist records will be overwritten by the latest record.

• When overwriting happens, the earlist whole sector will be erased (64 kB data will be erased). It is recommended that users retrieve all the data and save them before the memory is full in order to avoid data loss.

• There are two regions displaying register number, total used bytes and remaining bytes. These values are automatically calculated by the software according to users' selected parameters. The total bytes available is 234.

Retrieve Record

There are two methods to retrieve records: manual retrieve and automatic retrieve. The retrieve page can be found in Figure 4-14.

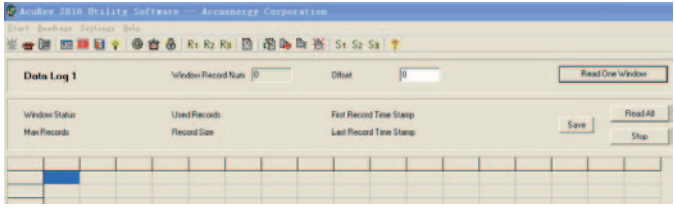


Figure 4-14 Log #1 Record Retrieve

In manual retrieve mode, users can adjust Offset and Window Record Number. Offset is the deviation number from the first record. Window Record Number is 246 / Record Size, users can retrieve no larger than this number of records by pressing "Read One Window" button.

In automatic retrieve mode, the software retrieves all the Used Records in the memory automatically. Users just press "Read All" button.

4.9 Device Information

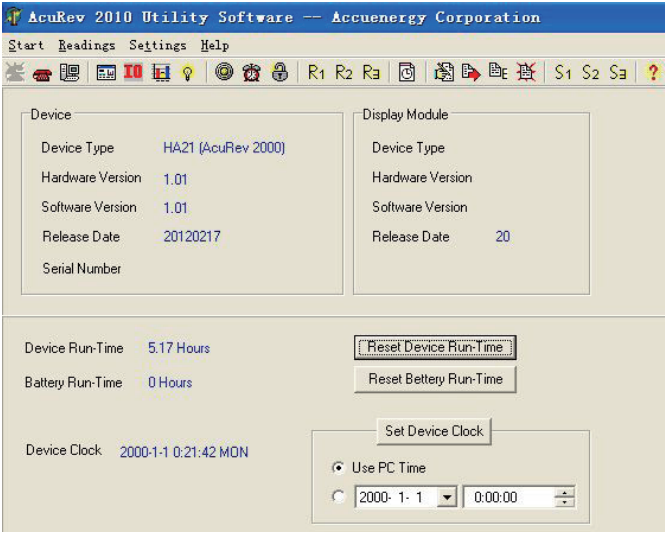


Figure 4-15 Device Information

Chapter 5 Communication

5.1 Modbus Protocol Introduction

5.2 Modbus Communication Format

5.3 Application Details and Parameter Address Table

AcuRev 2000 supports Modbus communication protocols. The infrared port supports field meter reading; The meter supports 10/100 M Ethernet port, protocols are Modbus TCP, SMTP, HTTP.

5.1 Modbus Protocol Introduction

1.Transmission mode

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

- ▲ Coding System 8 bit
- ▲ Start bit 1 bit
- ▲ Data bits 8 bit
- ▲ Parity No Parity
- ▲ Stop bit 1 bit
- ▲ Error checking CRC

2. Frame

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

Frame Format

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

Figure 5-1 Data Frame Format

Address Field

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

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

Function Field

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

Code	Meaning	Action
01	Read DO status	Obtain Digital (Relay) Output current status (ON/OFF)
02	Read DI status	Obtain Digital Input current status (ON/OFF)
03	Read Data	Obtain current binary value from one or more registers
05	Control DO	Control Digital (Relay) Output(ON/OFF)
16	Preset multiple registers	Place specifc value into a series of consecutive multiple-registers

Table 5-2 Function Code

Data Field

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

Error Check Field

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

3. CRC Check

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

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

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

When generating the CRC, each 8-bit character is exclusive ORed with the register

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

5.2 Modbus Communication Format

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

Figure 5-3 Protocol Illustration

Addr: Slave device address

Fun: Function Code

Data start reg hi: Start register address, high byte

Data start reg lo: Start register address, low byte

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

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

CRC16 Hi: CRC high byte

CRC16 Lo: CRC low byte

1. Read Relay Output status(Function Code 01)

Query

The master device sends query frame to the salve deivce. Function Code 01 allows users to acquire the relay output status (1=ON, 0=OFF) of the slave device with the specified address. On top of slave device address and function code, query frame must contain the relay register starting address and the number of registers to be read.

Table 5-4 depicts reading Relay 1 and Relay 2 status of the slave device with the address of 17.

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

Table 5-4 Query frame of reading Relay Output status

Response

The slave device anwsers the master device's query. The response frame contains slave device address, function code, data quantity and CRC check. Each relay utilizes one bit(1 = ON , 0 = OFF). Table 5-5 depicts the response frame.

Addr	Fun	Byte count	Data	CRC16 hi	CRC16 lo
11H	01H	01H	02H	D4H	89H

Data Bytes

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

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

Table 5-5 Response frame of reading Relay Output status

2. Read the status of DI (Function Code 02)

Query

On top of slave device address and function code, query frame must contain the digital input register starting address and the number of registers to be read. DI register address starts from 0000H(DI1=0000H, DI2=0001H, DI3=0002H, DI4=0003H).

Table 5-6 depicts of reading DI1 to DI4 status of the slave device with the address of 17.

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

Table 5-6 Query frame of reading DI status

Response

The slave device anwsers the master device's query. The response frame contains slave device address, function code, data quantity and CRC check.Each DI utilizes one bit(1 = ON , 0 = OFF).Table 5-7 depicts the response frame.

Addr	Fun	Byte count	Data0	CRC16 hi	CRC16 lo
11H	02H	01H	03H	E5H	49H

Data Bytes

0	0	0	0	DI4	DI3	DI2	DI1
0	0	0	0	0	0	1	1

MSB LSB

Table 5-7 Response frame of reading DI status

3. Read Data (Function Code 03)

Query

This function allows the master to obtain the measurement results from the meter.

Table 5-8 depicts reading slave device (address 17) Inline A real-time energy, Inline B real-time energy, , Inline C real-time energy (these parameters are dword data type, each parameter uses 2 addresses, each address uses 2 bytes). AcuRev 2000 Inline A real-time energy address is 4500H, 4501H; Inline B real-time energy address is 4502H, 4503H; Inline C real-time energy is 4504H, 4505H.

Addr	Fun	Data start addr hi	Data start Addr lo	Data #of regs hi	Data #of regs lo	CRC16 hi	CRC16 lo
11H	03H	45H	00H	00H	06H	D2H	54H

Table 5-8 Query of Inline A real-time energy, Inline B real-time energy, Inline C real-time energy

Response

Response frame contains slave device address, function code, data quantity and CRC check.

Table 5-9 depicts Inline A real-time energy=0000000BH(1.1kWh), Inline B real-time energy= 0000000CH(1.2kWh), Inline C real-time energy=0000000D(1.3kWh).

Addr	Fun	Byte count	Data1 hi	Data1 Lo	Data 2 hi	Data2 lo	Data3 hi	Data3 lo	Data4 hi	Data4 lo
11H	03H	0CH	00H	00H	00H	0BH	00H	00H	00H	0CH

Data5 hi	Data5 Lo	Data 6 hi	Data6 lo	CRC16 hi	CRC16 lo
00H	00H	00H	0DH	21H	88H

Table 5-9 Response of Inline A real-time energy, Inline B real-time energy, Inline C real-time energy

4. Control Relay Output (Function Code 05)

Query

This query frame forces the relay status to ON or OFF. Data FF00H sets the relay as ON, and data 0000H sets the relay as OFF. The relay will not be influenced by any other data input

The following is to query slave device 17 to set relay status as ON.

Addr	Fun	DO addr hi	DO addr Lo	Value Hi	Value lo	CRC16 hi	CRC16 lo
11H	05H	00H	00H	FFH	00H	8EH	AAH

Table 5-10 Control relay status query frame

Response

The correct response to this request is to send back the received data after the relay status is changed.

Addr	Fun	Do addr Hi	Do addr Lo	Value Hi	Value Lo	CRC16 Hi	CRC16 Lo
11H	05H	00H	00H	FFH	00H	8EH	AAH

Table 5-11 Control relay status response frame

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

Query

Function Code 16(10H Hex) allows the user to modify the contents of multiple registers. The example below is a request to preset device address of 17's tenant #1's real-time energy as 12345.6 kWh. AcuRev 2000 energy is raw data multiplied by 0.1 kWh, therefore, the value written into the register should be 123456, hex format is 01E240H. Tenant #1's real-time energy address is 4600H and 4601H, 32 bit, total 4 Bytes.

Addr	Fun	Data start reg hi	Data start reg lo	Data #of reg hi	Data #of reg lo	Byte Count
11H	10H	46H	00H	00H	02H	04H

Value hi	Value Lo	Value hi	Value lo	CRC hi	CRC lo
00H	01H	E2H	40H	BEH	B6H

Table 5-12 Preset tenant #1's real-time energy

Response

The correct response is to send back address, function code, data starting address, data bytes, CRC check after the value is changed.

Addr	Fun	Data start reg hi	Data start reg lo	Data #of reg hi	Data #of Reg lo	CRC16 hi	CRC16 lo
11H	10H	46H	00H	00H	02H	56H	10H

Table 5-13 Preset Multi-reigster response frame

5.3 Application Details and Parameter Address Table

1. Data Type

"Bit"is binary value;

"Word" is 16-bit unsigned integer, using one register address, 2 bytes. The data range is 0-65535.

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

"dword"is 32-bit unsigned integer, using two register addresses, high bytes followed by low bytes, using 4 bytes in total. The data range is 0-4294967295; Rx = High Word x 65536 + Low Word.

"float"is single precision floating point, using two register addresses, 4 bytes.The data range is 0.0-3.402823E +38.

2. The relationship between communication value and real value

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

Parameter	Relationship	Unit
System Parameter, Status Parameter	The communcation value equals the real value	No Unit
Meter and Battery runtime	T=Rx/100	Hour
Real-time Clock, Timestamp	The communcation value equals the real value	Time Unit
Energy	E=Rx/1000(3 decimal places) E=Rx/100(2 decimal places)	kWh
Power Demand	P=Rx/1000(3 decimal places) P=Rx/100(2 decimal places)	kW
Frequency	F=Rx/100	Hz
Power Factor	The communcation value equals the real value	No Unit
Voltage	The communcation value equals the real value	Volt
Current	The communcation value equals the real value	Ampere
Harmonic Parameter	The communcation value equals the real value	No Unit
Pulse Counted	Value=Rx/100	According to settings

Table 5-14 The relationship between communication value and real value (Rx is the communication value)

3. Parameter Address Table

Please refer to Appendix D

Appendix

Appendix A Technical Data and Specification

Appendix B Pulse Output Settings

Appendix C Ordering Information

Appendix D Address Table

Appendix E Version Information

Appdenxi A Technical Data and Specifications

1. Input

Voltage Input	
Voltage Rating	400Vac L-N, 690Vac L-L
Overload	1500Vac Continuously; 2500Vac, 50/60Hz 1 minute
Input Impedance	2MΩ / phase
Frequency Range	45Hz-65Hz
PT Burden	<0.2VA

Current Input (Direct Input or Via CT)
Via CT
Solid Core CT, 20A, 80A, 150A, 200A
Direct Input
Each Tenant Max Current 20 (80) A

2.Measurement

Parameter	Accuracy ±(%rdg)	Resolution	Range
Real Energy	1%	0.01kWh	0~999999.9kwh
Voltage	0.5%	0.1V	10~400V
Current	0.5%	0.001A	5mA~10000A
Real Power	1%	0.1var	4000.0kW
Reactive Power	1%	0.1VA	4000.0kvar
Apparent Power	1%	0.1VA	4000.0kVA
Power Factor	1%	0.001	-1.000~1.000
Frequency	0.2%	0.01Hz	45~65Hz
Power Demand	1%	0.1W	4000.0kW
Current Demand	0.5%	0.001A	5mA~10000A
Harmonics	2%	0.01%	0~100%
Unbalance	1%	0.01%	0~100%
Meter Runtime		0.01 hour	0~999999.9 hours

3.IO

Digital Input(DI)	
Input Type	Dry Contact
Max Input Current	2 mA
Input Voltage	15-30 V
Start Voltage	12 V
Stop Voltage	10 V
Pulse Max Frequency	100 Hz, 50% Duty Ratio
SOE Resolution	2 ms

DI Power Supply (24V)	
Voltage	24 Vdc
Power	1 W

	Relay Output(RO)
Voltage	250 Vac, 30 Vdc
Load Current	3 A
Set Time	10 ms(Max)
Contact Resistance	100 mΩ(Max)
Isolation Voltage	2500 V
Mechanical Life	1.5×10^{7}

4.Power Supply

Power Supply	100-415Vac, 50/60Hz; 100-300Vdc
Burden	5W

5.Environment

Operation Temperature	-25°C-70°C
Power Consumption	1 W
Relative Humidity	5%-95% non-condensing
Elevation above sea level	3000 m

6. Measurement Standard

Measurement Standard	
IEC62053-21	Static meters for active energy (classes 1 and 2)
Environmental Standard	IEC 60068-2
Safety Standard	IEC 61010-1, UL 61010-1

Appendix B Pulse Output Setup

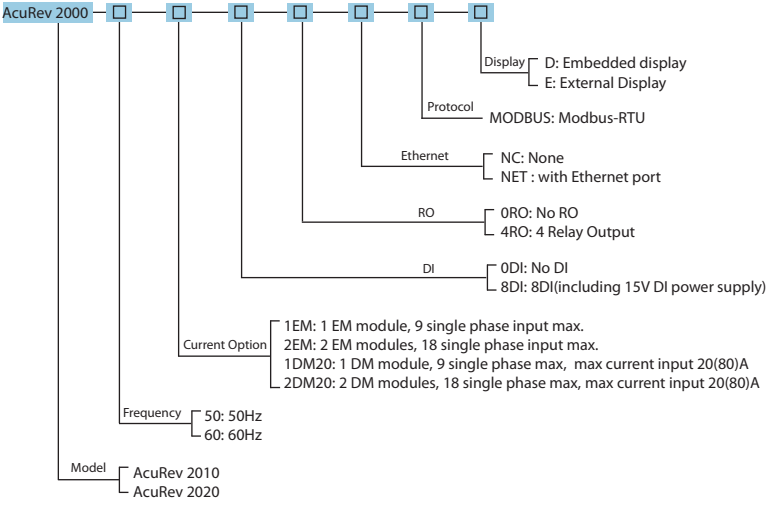
Wiring	Set Value	Output
Wiring Method 0	0	No Output
	1	Ep1
	2	Ep2
	3	Ep3
	4	Ep4
	5	Ep5
	6	Ep6
	7	Ep7
	8	Ep8
	9	Ep9
	10	Ep10
	11	Ep11
	12	Ep12
	13	Ep13
	14	Ep14
	15	Ep15
	16	Ep16
	17	Ep17
	18	Ep18
	19	Epin-s(Inline)

Wiring	Set Value	Output
Wiring Method 1	0	No Output
	1	Ep1
	2	Ep2
	3	Ep3
	4	Ep4
	5	Ep5
	6	Ep6
	7	Ep7
	8	Ep8
	9	Ep9
	10	Ep10
	11	Ep11
	12	Ep12
	13	Ep13
	14	Ep14
	15	Ep15
	16	Ep16
	17	Ep17
	18	Ep18
	19	Epin-A(Inline)
	20	Epin-B(Inline)
	21	Epin-C(Inline)
	22	Epin-S(Inline)

Wiring	Set Value	Output
Wiring Method 2	0	No Output
	1	Eps1-A
	2	Eps1-B
	3	Eps1-C
	4	Eps1-S
	5	Eps2-A
	6	Eps2-B
	7	Eps2-C
	8	Eps2-S
	9	Eps3-A
	10	Eps3-B
	11	Eps3-C
	12	Eps3-S
	13	Eps4-A
	14	Eps4-B
	15	Eps4-C
	16	Eps4-S
	17	Eps5-A
	18	Eps5-B
	19	Eps5-C
	20	Eps5-S
	21	Eps6-A
	22	Eps6-B
	23	Eps6-C
	24	Eps6-S
	25	Epin-A(Inline)
	26	Epin-B(Inline)
	27	Epin-C(Inline)
	28	Epin-S(Inline)

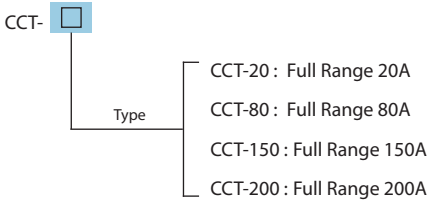
Wiring	Set Value	Output
Wiring Method 3	0	No Output
	1	Eps1-S
	2	Eps2-S
	3	Eps3-S
	4	Eps4-S
	5	Eps5-S
	6	Eps6-S
	7	Epin-S(Inline)
Wiring Method 4	0	No Output
	1	Eps1-A
	2	Eps1-B
	3	Eps1-S
	4	Eps2-A
	5	Eps2-B
	6	Eps2-S
	7	Eps3-A
	8	Eps3-B
	9	Eps3-S
	10	Eps4-A
	11	Eps4-B
	12	Eps4-S
	13	Eps5-A
	14	Eps5-B
	15	Eps5-S
	16	Eps6-A
	17	Eps6-B
	18	Eps6-S
	19	Epin-A(Inline)
	20	Epin-B(Inline)
	21	Epin-S(Inline)

Appendix C Ordering Information



Current Transformer

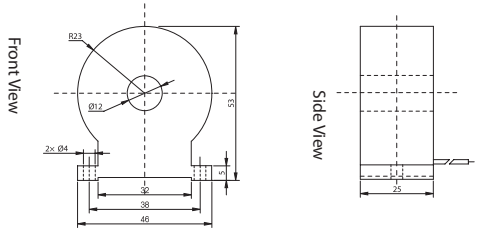
Solid Core



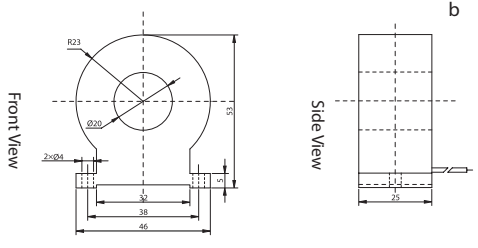
Specification: Secondary wire length is 1.5 m.

CCT-20/CCT-80

a

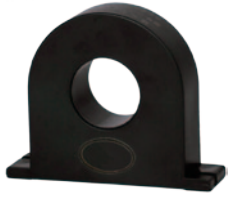


b

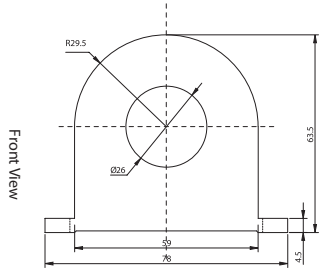


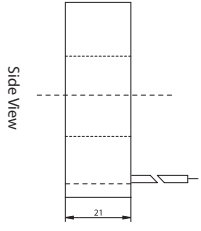
Type	Φ	Height(mm)	Length(mm)	Width(mm)	Dimensions
CCT-20	12	53	46	25	Figure-a
CCT-80	20	53	46	25	Figure-b

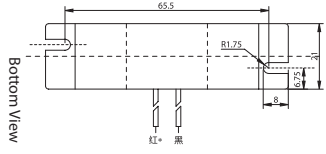
c



CCT-150/CCT-200







Type	Φ	Height(mm)	Length(mm)	Width(mm)	Dimensions
CCT-150	26	63.5	78	21	Figure-c
CCT-200	26	63.5	78	21	

Appendix D Parameter Address Table

System Settings

Users should thoroughly understand the system settings as they contribute to the meter operation mode. The details on system settings can be found in Chapter 4.

Function Code 10H: Write, 03H: Read. Date Type: Word. Format Code: F1.

Address	Parameter	Property	Range	Default	Date Type
1000H	Wiring	R/W	0: Single Phase In-Single Phase Out 1: Three Phase 4 In-Single Phase Out 2: Three Phase 4 In-Three Phase 4 Out 3: Three Phase 3 In(3LL)-Three Phase 3 Out 4: Single Phase 3 In-Single Phase 3 Out	0	Word
1001H	Tenant Number	R/W	Wiring 0: 1-18 Wiring 1: 1-18 Wiring 2: 1-6 Wiring 3: 1-6 Wiring 4: 1-6	18	Word
1002H	CT1	R/W	1-10000	5	Word
1003H	CT2	R/W	1-100	5	Word
1004H	Address	R/W	1-247	1	Word
1005H	Parity Setting	R/W	0: Even Parity 1: Odd Parity 2: No Parity, Stop Bit 2 3: No Parity, Stop Bit 1	0	Word
1006H	Channel 1 Baud Rate	R/W	1200-19200	9600	word
1007H	Channel 2 Baud Rate	R/W	1200-19200	9600	

1008H	Password	R/W	0000-9999	0000	word
1009H	Energy Pulse Constant	R/W	500-20000	5000	word
100AH	Energy Pulse Width	R/W	20-100ms	80	word
100BH	DO1 Energy Pulse Output Setting	R/W	See Appendix B	1	word
100CH	DO2 Energy Pulse Output Setting	R/W	See Appendix B	1	word
100DH	Demand Calculation	R/W	0: Sliding Window 1: Rolling Window 2: Fixed Window 3: Thermal	0	word
100EH	Primary Demand Window	R/W	1-30 minutes	15	word
100FH	Secondary Demand Window	R/W	1-30 minutes	1	word
1010H	DI Synchronization Source	R/W	1-8: DI1-DI8 as Synchronization Source	1	word
1011H	DI Triggering Condition	R/W	0: No Triggering 1: Rising Edge 2: Falling Edge 3: By Changes	0	word
1012H	DI Working Mode	R/W	bit0-bit7 correspond to DI1-DI8 0: State Monitoring 1: Pulse Counter	0	word
1013H-101AH	DI1-8 Pulse Constant for each channel	R/W	1-65535	1	word
101BH-1022H	DI Category, x8	R/W	i.e. one pulse represents 20 tons water	1	word
1023H-102AH	DI Unit, x8	R/W	1: t(ton) 2: m3(cubic meter) 3: kWh 4: ¥(RMB) 5: $(US Dollar)	1	word

102BH	Relay Output Working Mode	R/W	bit0-bit3 correspond to RO1-RO4 0: Relay Control 1: Alarming	0	word
102CH	Relay Control Mode	R/W	bit0-bit3 correspond to RO1-RO4 0: Latching 1: Momentary	0	word
102DH	Relay Control Momentary Time	R/W	50-3000ms	80	word
102EH	Alarming Feature	R/W	0: Disable 1: Enable	0	word
102FH	1-10 Alarming Channel	R/W	Bit0-bit9 correspond to 1-10 alarming channels 1: Active 0: Inactive	0	word
1030H	Each event alarm is sent to RO feature bit. 2 bytes represent 16 events sent to RO feature	R/W	Bit0-15 correspond to 16 Events 1: Enable 0: Disable	0	word
1031H	RO alarming, each one of the first 8 events corresponds to RO settings	R/W	2 Bytes. Every 2 bit correspond to one event, the RO number is: 00 RO1 01 RO2 10 RO3 11 RO4	0	word
1032H	Same as above, the last 8 events	R/W	2 Bytes. Every 2 bits correspond to one event, the RO number is: 00 RO1 01 RO2 10 RO3 11 RO4	0	word
1033H	RO alarming time delay, not applicable to over/under limit alarming	R/W	1-60000 (second)	60	word
1034H	Backlight time	R/W	0-60 (minute)	1	word

1035H	Automatic display if no key is pressed in how long	R/W	1-60 (minute)	1	word
1036H	Automatic Display, each screen duration	R/W	5-100 (second)	5	word
1037H	Display Power (demand) decimal place	R/W	3-4 digit	3	word
1038H	Basic Parameter Mode	R/W	0: Secondary 1: Primary	0	word
1039H	Reactive Power	R/W	0: True 1: Generalized	0	word
103aH	VAR/PF Convention	R/W	0: IEC 1: IEEE	0	word
103bH	Clear all data digits to clear all records	R/W	See Appendix	0	word
103c	DI Pulse Counter clear	R/W	bit0-bit7 correspond to DI1-DI8, 1 means clearing the counter	0	word
103dH-104FH	Reserved				word

Meter and Battery Runtime

Function Code 03: Read. Data Type: Word

Address	Parameter	Property	Data Type
1050-1051	Meter Runtime	R	dword
1052-1053	Battery Runtime	R	dword

Clock

Function Code 03: Read, Function Code 16: Write. Date Type: Word

Address	Parameter	Property	Range	Default	Data Type
1054	Year	R/W	0-99		word
1055	Month	R/W	1-12		word
1056	Day	R/W	1-31		word
1057	Hour	R/W	0-23		word
1058	Minute	R/W	0-59		word
1059	Second	R/W	0-59		word
105A	Week	R/W	0-6, 0: Sunday		word

Over/Under Limit Alarming

There are a total of 10 groups for alarming, each group follows the same format. Function Code 03: Read. Function Code 16: Write.

Address	Parameter	Property	Range	Default	Data Type
105B	Group 1: Parameter Number	R/W	0~363	0	integer
105C	Group 1: Comparison	R/W	1: larger than 2: equal to 3: smaller than	1	integer
105D	Group 1: Set Value	R/W	Related percentage		integer
105E	Group 1: Delay Time	R/W	0~30000	0	integer
105F	Group 1: Output to RO	R/W	0: disabled 1-4: RO number	0	integer
1060-1064	Group 2 setup	R/W	The same as Group 1		integer
1065-1069	Group 3 setup	R/W	The same as Group 1		integer
106A-106E	Group 4 setup	R/W	The same as Group 1		integer
106F-1073	Group 5 setup	R/W	The same as Group 1		integer
1074-1078	Group 6 setup	R/W	The same as Group 1		integer
1079-107D	Group 7 setup	R/W	The same as Group 1		integer
107E-1082	Group 8 setup	R/W	The same as Group 1		integer
1083-1087	Group 9 setup	R/W	The same as Group 1		integer
1088-108C	Group 10 setup	R/W	The same as Group 1		integer
108D	Load Voltage Setup	R/W	Default 220V		integer
108E	Load Current Setup	R/W	Default 5A		integer

Time of Use Parameter Setup

Before 109F: basic settings. After 109F: Season, Schedule and Holiday settings. Maximum: 14 seasons, 8 schedule tables, 14 schedules, 30 holidays.Two error words indicate the incorrect settings.

Function Code 03: Read, Function Code 16: Write

Address	Parameter	Property	Range	Default	Data Type
1090	Error word 1(basic paramter)	R	See Appendix		word
1091	Error word 2(schedule table)	R	See Appendix		word
1092	Current Tariff	R	1-4	1	word
1093	Season	R/W	1-14	2	word
1094	Schedule Table	R/W	1-8	2	word
1095	Schedule	R/W	1-14	9	word
1096	Tariff	R/W	1-4	4	word
1097	Weekend	R/W	Bit0-7 1: ON, 0: OFF	0x7F	word
1098	Weekend Schedule	R/W	1-8	2	word
1099	Holiday	R/W	0-30	0	word
109A	TOU Energy monthly settle up	R/W	1: special day 0: end of month	0	word
109B	TOU Energy Special Day settle up: Day	R/W	1-28	1	word
109C	TOU Energy Special Day settle up: Time	R/W	0-23	0	word
109D	TOU Energy Enable	R/W	1	1	word
109E	TOU Energy reset to factory	R/W	1		word
109F-10AF	Reserved				
10B0-10B2	Season 1(month, Day, Schedule Table Number)	R/W			word
10B3-10B5	Season 2(month, Day, Schedule Table Number)	R/W			word

Address	Parameter	Property	Range	Data Type
10B6-10B8	Season 3(month, Day, Schedule Table Number)	R/W		word
10E9-10EB	Schedule Table 1, 6th schedule (Hour, Minute, Tariff Number)	R/W		word
10EC-10EE	Schedule Table 1, 7th schedule (Hour, Minute, Tariff Number)	R/W		word
10EF-10F1	Schedule Table 1, 8th schedule (Hour, Minute, Tariff Number)	R/W		word
10F2-10F4	Schedule Table 1, 9th schedule (Hour, Minute, Tariff Number)	R/W		word
10F5-10F7	Schedule Table 1, 10th schedule (Hour, Minute, Tariff Number)	R/W		word
10F8-10FA	Schedule Table 1, 11th schedule (Hour, Minute, Tariff Number)	R/W		word
10FB-10FD	Schedule Table 1, 12th schedule (Hour, Minute, Tariff Number)	R/W		word
10FE-1100	Schedule Table 1, 13th schedule (Hour, Minute, Tariff Number)	R/W		word
1101-1103	Schedule Table 1, 14th schedule (Hour, Minute, Tariff Number)	R/W		word
1104-112D	Schedule Table 2, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
112E-1157	Schedule Table 3, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
1158-1181	Schedule Table 4, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
1182-11AB	Schedule Table 5, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word

11AC-11D5	Schedule Table 6, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
11D6-11FF	Schedule Table 7, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
1200-1229	Schedule Table 8, 1st-14th schedule (Hour, Minute, Tariff Number)	R/W	The same as Schedule Table 1	word
122A122C	The 1st Holiday(Month, Day, Schedule Number)	R/W		word
122D-122F	The 2nd Holiday(Month, Day, Schedule Number)	R/W		word
1230-1232	The 3rd Holiday(Month, Day, Schedule Number)	R/W		word
1233-1235	The 4th Holiday(Month, Day, Schedule Number)	R/W		word
1236-1238	The 5th Holiday(Month, Day, Schedule Number)	R/W		word
1239-123B	The 6th Holiday(Month, Day, Schedule Number)	R/W		word
123C-123E	The 7th Holiday(Month, Day, Schedule Number)	R/W		word
123F-1241	The 8th Holiday(Month, Day, Schedule Number)	R/W		word
1242-1244	The 9th Holiday(Month, Day, Schedule Number)	R/W		word
1245-1247	The 10th Holiday(Month, Day, Schedule Number)	R/W		word
1248-124A	The 11th Holiday(Month, Day, Schedule Number)	R/W		word
124B-124D	The 12th Holiday(Month, Day, Schedule Number)	R/W		word
124E-1250	The 13th Holiday(Month, Day, Schedule Number)	R/W		word

1251-1253	The 14th Holiday(Month, Day, Schedule Number)	R/W		word
1254-1256	The 15th Holiday(Month, Day, Schedule Number)	R/W		word
1257-1259	The 16th Holiday(Month, Day, Schedule Number)	R/W		word
125A-125C	The 17th Holiday(Month, Day, Schedule Number)	R/W		word
125D-125F	The 18th Holiday(Month, Day, Schedule Number)	R/W		word
1260-1262	The 19th Holiday(Month, Day, Schedule Number)	R/W		word
1263-1265	The 20th Holiday(Month, Day, Schedule Number)	R/W		word
1266-1268	The 21th Holiday(Month, Day, Schedule Number)	R/W		word
1269-126B	The 22nd Holiday(Month, Day, Schedule Number)	R/W		word
126C-126E	The 23rd Holiday(Month, Day, Schedule Number)	R/W		word
126F-1271	The 24th Holiday(Month, Day, Schedule Number)	R/W		word
1272-1274	The 25th Holiday(Month, Day, Schedule Number)	R/W		word
1275-1277	The 26th Holiday(Month, Day, Schedule Number)	R/W		word
1278-127A	The 27th Holiday(Month, Day, Schedule Number)	R/W		word
127B-127D	The 28th Holiday(Month, Day, Schedule Number)	R/W		word
127E-1280	The 29th Holiday(Month, Day, Schedule Number)	R/W		word
1281-1283	The 30th Holiday(Month, Day, Schedule Number)	R/W		word

Trending Record Settings

1300H	Log1 Register Number, Sector Number	R/W	#Registers: 0-117 #Sectors: 0-10	word
1301H	Log1 logging Interval	R/W	0-65535	word
1302H-1376H	Log1 register #1-#117 identifier	R/W	0-65535	word
1377H-13B1H	Log1 register #1-#117 descriptors	R/W	High 4 bit: data type Low 4 bit: data length	byte
13B2H	Logging Timer	R/W	0: disable 1: enable	word
13B3H	Starting Year/Month	R/W		word
13B4H	Starting Day/Hour	R/W		word
13B5H	Starting Minute/Second	R/W		word
13B6H	Ending Year/Month	R/W		word
13B7H	Ending Day/Hour	R/W		word
13B8H	Ending Minute/Second	R/W		word
13B9H	Clear Trending Log	R/W	0: not clear 1: clear	word
13C0H-1479H	Log2 setting		the same as Log1	
1480H-1539H	Log3 setting		the same as Log1	

The logging can be implemented by puting the desired parameter Modbus address in the register of Trending Record. Some parameters use 2 Modbus registers, so the descriptor is required. A descriptor represents how many Modbus registers a parameter uses.

For example, register 4102H and 4103H are configured as a specific record, the corresponding descriptor is 2, the software can display content as "Tenant 1 Power".

Trending log setting includes: Log1 Setting, Log2 Setting, Log3 Setting.

1300H-13BFH (Log1)

13C0H-147FH (Log2)

1480H-153FH (Log3)

Range: each record uses 192 registers (384 bytes)

Trending record setting:

1300-1301H	1302-1376H	1377-13B1H	13B2-13B8H
Log Settings	Parameter Regsiter Address	Register Property	Logging Timer

1)Log Settings

Register 1300H-1301H

Size 2

Address	1300H		1301H	
Bytes	0(Low Byte)	1(High Byte)	2(Low Byte)	3(High Byte)
Parameter	Sector #	Register #	Logging Timer	

Register Number: The number of Modbus registers. Data range 0-117.The trending record size is Register Number x 2 + 12.

Sector Number: Each sector is 64 kB. Trending Log1, Log2, Log3 in total use 60 sectors, the range is 0-60.(The logging is disabled if the setting is set as 0.)

Logging Interval: the time interval between two records. the unit is minute. The range is 0-1440.(when it is set as 0, logging will be disabled.)

2)Parameter Address

Register: 1302H-1376H

Size: One parameter uses one, two or three Modbus register addresses, in total there are 117 addresses.

Note: when 117 registers are all fully assigned, be sure that no extra parameters will be assgined. For example, all parameter registers are energy, when all 117 registers are full, it leads to that the last energy only uses one Modbus address. The last value will be incorrect because every energy uses two Modbus addresses.

Unused register should be set as 0000H or FFFFH.

3)Regsiter Property:

Register: 1377H-13B1H

Size: one register uses one byte, in total there are 117 descriptors.(59 register addresses)

The descriptor indicates how many register number one parameter uses. It can be set as 1 or 2 or 3.

4)Logging Timer

Register 13B2H is Log1 Logging Timer. 0—disable timer; 1—enabld timer. 13B3H-13B5H is to set Logging TImer starting time, 13B6H-11B7H is to set Logging Timer ending time. A record will be logged between starting time and ending time. When Logging Timer is enabled, it will stop logging when the memory is full.

Register 13B3H-13B5H(Logging Timer starting time)

13B6H-13B8H(Logging Timer ending time)

Size: 3 registers

Byte	0	1	2	3	4	5
Parameter	Year	Month	Day	Hour	Minute	Second

Trending Log Status

Trending Log Status describes the current status of each record.

Address	Parameter	Range	Data Type	Data Property
6100H-6101H	Max Record	0-299580	dword	R
6102H-6103H	Used Record	1-299580	dword	R
6104H	Record Size	14-246	dword	R
6105H	Reserved			R
6106H-6108H	First Record Time		word	R
6109H-610bH	Last Record Time		word	R
6200H-620bH	Log2 Status	The same as Log1		
6200H-620bH	Log3 Status	The same as Log1		

Max Record: the maximum number of records the log can record based on the given Record Size and Sector Number.

Used Record: The record number of the log, when the log is full, it should equal Max Record.

When the log is reset, User Record will be changed to 1.

Record Size: Each record size in the log, including timestamp.

The trending record format is Record Number(4bytes)+ Timestamp(6bytes) + [Data1-Data N](2Nbytes) + CRC(2bytes).

First Record Time: First Record, the earlist record time.

Last Record Time: Last Record, the latest record time.

Trending Record Retrieve

Trending Record can be divided into two parts: File Header and Main Window. File Header is used to finalize the contents displayed in Main Window. Main Window is a sliding window representing all the records. 3 trending records have one address.

Register 6000H-6003H

Size 4

Address	Parameter	Property	Format	Description
6000H	Record Type	R/W	Nnnnnnnn	Record TYpe
			ssssssss	Reserved
6001H	Window Record Number, Status	R/W	wwwwwwww	Status
			nnnnnnnn	Window Record Number
6002H-6003H	Window Status + Record Offset	R/W		
6004H-607eH	Window	R		

Record Type: which record will be read

0 — Log 1

1 — Log 2

2 — Log 3

Record Number: the record number each window displays. Please note this Record Number cannot exceed the window size. This setting tells AcuRev 2000 how many records are saved in Main Window. Window size bytes equal window record multiplied with Record Size.

For example, a record size is 50, the window size should be 246/50 = 4.

Status: Window Status indicates the data status of the current window. It may exceed the time delay 1 second when AcuRev 2000 is preparing for a one window size data. This byte represents the data effectiveness, if the window records are not effective, the data will be ignored. In addition, it takes time to erase the memory. The memory erasing status can be represented by this byte. If Window Status is read only, all writing operations are disabled.

bH Window Status effective

FFH Window Status not effective

aaH Data Log erasing in operation

bbH Data Log erasing not in operation

Offset: this parameter is configurable. In order to read all the records of one log, users can just modify this offset value. When the data is retrieved, the first data is locked, so offset 0 is always pointed at the first data.

Window: a window is where to store the data, the window is read only. Please note, the data number in the window is an integer.

Retrieve Note

When the data logging is full, the logging timer will erase the first sector's content and continue. It is recommended that users retrieve the data log before it gets logged full. For instance, log 1 uses 3 sectors, each sector saves 448 records, in total there will be 1344 records. When the user retrieves the data when 1340 records are used, the first sector of

log 1 will be erased without being retrieved.

Data Retrieve Example

• The example is based on log 1.

• The logging content is Tenant 1 Power, Tenant 2 Power and Tenant 3 Power (12 bytes), the logging interval is 1 minute, sector number is 10, register number is 6, logging timer is disabled.

• The Offset is 0.

• There are no new records logged while retrieving.

a)Trending Log Setup

Setup Log 1:

1. Set Tenant 1 Power, Tenant 2 Power, Tenant 3 Power into this log. Since each parameter uses two Modbus registers, set 0x4102, 0x4103, 0x410e, 0x410f, 0x411a, 0x411b to 0x130 2, 0x1303, 0x1304, 0x1305, 0x1306 and 0x1307.The descriptor is 2, so at the same time set 0x0202, 0x0200 to 0x1377, 0x1378.

2. The register number is 6, it uses 10 sectors. So set 0x060A to 0x1300.

3. The logging interval is 1 minute, set 0x0001 to 0x1301.

4. Disable the Logging Timer, set 0 to 0x13b9.The default setting is disabled.

b)Data Log Retrieve

The following describes how to retrieve from the earlist record to the latest record.

1. Calculate the max record number a window holds. The max record number = 246 / Record Size. In this example, 246 / 24 = 10.

2. Set the max record number and Offset to the meter. Initially the Offset is 0.In this example, set 0x0A0B and 0x0000 to 0x6001 and 0x6002.

3. Read the Window Status from 0x6001, if the status says 0xFF, then go to step 2) to set max record number and Offset again. If the status says 0x0B, the content of the window will be read.

4. Read the window content and calculate the next record offset. The next record offset is the last record offset plus the max record number per window. After completing, set the new offset to 0x6002.Then repeat step 3 until all the records are retrieved.

Basic Measurement

The meter has different measuring contents under different wiring scenarios. The basic AcuRev 2010 only takes power related measurements. The format is floating point. Each parameter uses 4 bytes, high bytes are followed by low bytes. Function Code: 03.Read only.

Address	Parameter	Property	Data Range	Data Type
The following data does not have individual tenants. Under 3 phase 3 wire mode, real power, reactive power, apparent power, power factor and load nature has no meaning. Single phase current, real power, reactive power, apparent power, power factor and load nature has no meaning.				
4000-4001	F	R		float
4002-4003	U1	R		float
4004-4005	U2	R		float
4006-4007	U3	R		float
4008-4009	Uavg	R		float
400a-400b	U12	R		float
400c-400d	U23	R		float
400e-400f	U31	R		float
4010-4011	Ulavg	R		float
4012-4013	IL1(Phase A inline current)	R		float
4014-4015	IL2(Phase B inline current)	R		float
4016-4017	IL3(Phase C inline current)	R		float
4018-4019	Iavg(Average Current)	R		float
401A-401B	Pin-s inline system real power	R		float
401C-401D	Qin-s inline system reactive power	R		float
401E-401F	Sin-s inline system apparent power	R		float
4020-4021	PFin-s inline system power factor	R		float
4022-4023	Inline System Load Nature	R		float
4024-4025	Pin-A inline Phase A real power	R		float
4026-4027	Pin-B inline Phase B real power	R		float
4028-4029	Pin-C inline Phase C real power	R		float

402A-402B	Qin-A inline Phase A reactive power	R		float
402C-402D	Qin-B inline Phase B reactive power	R		float
402E-402F	Qin-C inline Phase C reactive power	R		float
4030-4031	Sin-A inline A apparent power	R		float
4032-4033	Sin-B inline B apparent power	R		float
4034-4035	Sin-C inline C apparent power	R		float
4036-4037	PFin-A inline A power factor	R		float
4038-4039	PFin-B inline B power factor	R		float
403A-403B	PFin-C inline C power factor	R		float
403C-403D	A inline load nature	R		float
0403E-403F	B inline load nature	R		float
4040-4041	C inline load nature	R		float
The following is 18 tenants' data under wire scenario 0 and 1.				
4100-4101	I1(Tenant 1 Current)	R	Tenant 1	float
4102-4103	P1(Tenant 1 Real Power)	R		float
4104-4105	Q1(Tenant 1 Reactive Power)	R		float
4106-4107	S1(Tenant 1 Apparent Power)	R		float
4108-4109	PF1(Tenant 1 Power Factor)	R		float
410A-410B	Load Nature 1(Tenant 1 Load Nature)	R		float
410C-4117	Tenant 2 Measurement	R	The same as Tenant 1	float
4118-4123	Tenant 3 Measurement	R	The same as Tenant 1	float
4124-412F	Tenant 4 Measurement	R	The same as Tenant 1	float
4130-413B	Tenant 5 Measurement	R	The same as Tenant 1	float
413C-4147	Tenant 6 Measurement	R	The same as Tenant 1	float
4148-4153	Tenant 7 Measurement	R	The same as Tenant 1	float
4154-415F	Tenant 8 Measurement	R	The same as Tenant 1	float
4160-416B	Tenant 9 Measurement	R	The same as Tenant 1	float
416C-4177	Tenant 10 Measurement	R	The same as Tenant 1	float
4178-4183	Tenant 11 Measurement	R	The same as Tenant 1	float
4184-418F	Tenant 12 Measurement	R	The same as Tenant 1	float
4190-419B	Tenant 13 Measurement	R	The same as Tenant 1	float
419C-41A7	Tenant 14 Measurement	R	The same as Tenant 1	float

41A8-41B3	Tenant 15 Measurement	R	The same as Tenant 1	float
41B4-41BF	Tenant 16 Measurement	R	The same as Tenant 1	float
41C0-41CB	Tenant 17 Measurement	R	The same as Tenant 1	float
41CC-41D7	Tenant 18 Measurement	R	The same as Tenant 1	float

The follwiing is 6 three phase tenants under wiring scenario 2, 3, 4.

Note: when the wiring setting is set as 3, it is three phase 3 wire or single phase 3 wire tenant, power does not have different phases, but current has different phases. Therefore real power, reactive power, apparent power, power factor, load nature do not have meanings.

When the wiring setting is set as 4, C phase current, real power, reactive power, apparent power, power factor, load nature do not have meanings.

Address	Parameter	Property	Data Range	Data Type
4300-4301	Ps1(Tenant 1 Total Real Power)	R		float
4302-4303	Qs1(Tenant 1 Total Reactive Power)	R		float
4304-4305	Ss1(Tenant 1 Total Apparent Power)	R		float
4306-4307	PFs1(Tenant 1 Total Power Factor)	R		float
4308-4309	Load Nature S1(Tenant 1 Load Nature)	R		float
430A-430B	Tenant 1 Phase A current			float
430C-430D	Tenant 1 Phase B current			float
430E-430F	Tenant 1 Phase C current			float
4310-4311	Tenant 1 Phase A Real Power			float
4312-4313	Tenant 1 Phase B Real Power			float
4314-4315	Tenant 1 Phase C Real Power			float
4316-4317	Tenant 1 Phase A Reactive Power			float
4318-4319	Tenant 1 Phase B Reactive Power			float
431A-431B	Tenant 1 Phase C Apparent Power			float
431C-431D	Tenant 1 Phase A Apparent Power			float

431E-431F	Tenant 1 Phase B Apparent Power			float
4320-4321	Tenant 1 Phase C Apparent Power			float
4322-4323	Tenant 1 Phase A Power Factor			float
4324-4325	Tenant 1 Phase B Power Factor			float
4326-4327	Tenant 1 Phase C Power Factor			float
4328-4329	Tenant 1 Phase A Load Nature			float
432A-432B	Tenant 1 Phase B Load Nature			float
432C-432D	Tenant 1 Phase C Load Nature			float
432E-435B	Tenant 2 Measurement	R	the same as Tenant 1	float
435C-4389	Tenant 3 Measurement	R	the same as Tenant 1	float
438A-43B7	Tenant 4 Measurement	R	the same as Tenant 1	float
43B8-43E5	Tenant 5 Measurement	R	the same as Tenant 1	float
43E6-4413	Tenant 6 Measurement	R	the same as Tenant 1	float

Energy

Energy data is different under different wiring settings. The decimal place for energy is 1, the real value is communication value divided by 10.The unit is kWh. Real-time energy and this month TOU energy is editable, but the prior month TOU energy cannot be edited. The data type is double word, each parameter uses two register address, 4 bytes. High bytes are followed by low bytes. Function Code 03 to read, Function Code 16 to write.

Address	Parameter	Property	Data Type
When the wiring setting is set as 3 phase 3 wire, phase A/B/C, this month and prior month energy reading have no meaning. When the wiring setting is set as single phase 3 wire, Phase C real time, this month and prior month energy have no meaning.			
4500-4501	Epin-A inline Phase A real time energy	RW	dword
4502-4503	Epin-B inline Phase B real time energy	RW	dword
4504-4505	Epin-C inline Phase C real time energy	RW	dword
4506-4507	Epin-S inline system real time energy	RW	dword

4508-4509	Epin-S inline system this month TOU energy	RW	dword
450A-450B	Epin-S inline system this month TOU energy (tariff 1)	RW	dword
450C-450D	Epin-S inline system this month TOU energy (tariff 2)	RW	dword
450E-450F	Epin-S inline system this month TOU energy (tariff 3)	RW	dword
4510-4511	Epin-S inline system this month TOU energy (tariff 4)	RW	dword
4512-4513	Epin-S inline system prior month TOU energy(prior month total)	R	dword
4514-4515	Epin-S inline system prior month TOU energy (tariff 1)	R	dword
4516-4517	Epin-S inline system prior month TOU energy (tariff 2)	R	dword
4518-4519	Epin-S inline system prior month TOU energy (tariff 3)	R	dword
451A-451B	Epin-S inline system prior month TOU energy (tariff 4)	R	dword
451C-451D	Epin-A inline Phase A this month TOU energy (total)	RW	dword
451E-451F	Epin-A inline Phase A this month TOU energy (tariff 1)	R/W	dword
4520-4521	Epin-A inline Phase A this month TOU energy (tariff 2)	R/W	dword
4522-4523	Epin-A inline Phase A this month TOU energy (tariff 3)	R/W	dword
4524-4525	Epin-A inline Phase A this month TOU energy (total)	R/W	dword
4526-4527	Epin-B inline Phase B this month TOU enery(total)	R/W	dword
4528-4529	Epin-B inline Phase B this month TOU enery (tariff 1)	R/W	dword
452A-452B	Epin-B inline Phase B this month TOU enery (tariff 2)	R/W	dword
452C-452D	Epin-B inline Phase B this month TOU enery (tariff 3)	R/W	dword
452E-452F	Epin-B inline Phase B this month TOU enery (tariff 4)	R/W	dword
4530-4531	Epin-C inline Phase C this month TOU enery (tariff 4)	R/W	dword
4532-4533	Epin-C inline Phase C this month TOU enery (tariff 1)	R/W	dword
4534-4535	Epin-C inline Phase C this month TOU enery (tariff 2)	R/W	dword
4536-4537	Epin-C inline Phase C this month TOU enery (tariff 3)	R/W	dword
4538-4539	Epin-C inline Phase C this month TOU energy(tariff 4)	R/W	dword
453A-453B	Epin-A inline A prior month TOU energy (Total)	R	dword
453C-453D	Epin-A inline A prior month TOU energy (Tariff 1)	R	dword
453E-453F	Epin-A inline A prior month TOU energy(Tariff 2)	R	dword
4540-4541	Epin-A inline A prior month TOU energy(Tariff 3)	R	dword
4542-4543	Epin-A inline A prior month TOU energy (Tariff 4)	R	dword

4544-4545	Epin-B inline B prior month TOU energy (Total)	R	dword
4546-4547	Epin-B inline B prior month TOU energy (Tariff 1)	R	dword
4548-4549	Epin-B inline B prior month TOU energy (Tariff 2)	R	dword
454A-454B	Epin-B inline B prior month TOU energy (Tariff 3)	R	dword
454C-454D	Epin-B inline B prior month TOU energy (Tariff 4)	R	dword
454E-454F	Epin-C inline C prior month TOU energy (Total)	R	dword
4550-4551	Epin-C inline C prior month TOU energy (Tariff 1)	R	dword
4552-4553	Epin-C inline C prior month TOU energy (Tariff 2)	R	dword
4554-4555	Epin-C inline C prior month TOU energy (Tariff 3)	R	dword
4556-4557	Epin-C inline C prior month TOU energy(Tariff 4)	R	dword
The following is Single Phase In-Single Phase Out under Wiring Setting 0 and 1, Three phase 4 In-Single Phase Out Tenant 1 to Tenant 18 single phase data.			
4600-4601	Tenant 1 real-time energy	R/W	dword
4602-4603	Tenant 1 this month TOU energy (total)	R/W	dword
4604-4605	Tenant 1 this month TOU energy (Tariff 1)	R/W	dword
4606-4607	Tenant 1 this month TOU energy (Tariff 2)	R/W	dword
4608-4609	Tenant 1 this month TOU energy (Tariff 3)	R/W	dword
460A-460B	Tenant 1 this month TOU energy (Tariff 4)	R/W	dword
460C-460D	Tenant 1 prior month TOU energy (total)	R	dword
460E-460F	Tenant 1 prior month TOU energy (Tariff 1)	R	dword
4610-4611	Tenant 1 prior month TOU energy (Tariff 2)	R	dword
4612-4613	Tenant 1 prior month TOU energy (Tariff 3)	R	dword
4614-4615	Tenant 1 prior month TOU energy (Tariff 4)	R	dword
4616-462B	Tenant 2 real-time energy	R/W	dword
462C-4641	Tenant 3 real-time energy	R/W	dword
4642-4657	Tenant 4 real-time energy	R/W	dword
4658-466D	Tenant 5 real-time energy	R/W	dword
466E-4683	Tenant 6 real-time energy	R/W	dword
4684-4699	Tenant 7 real-time energy	R/W	dword

469A-46AF	Tenant 8 real-time energy	R/W	dword
46B0-46C5	Tenant 9 real-time energy	R/W	dword
46C6-46DB	Tenant 10 real-time energy	R/W	dword
46DC-46F1	Tenant 11 real-time energy	R/W	dword
46F2-4707	Tenant 12 real-time energy	R/W	dword
4708-471D	Tenant 13 real-time energy	R/W	dword
471E-4733	Tenant 14 real-time energy	R/W	dword
4734-4749	Tenant 15 real-time energy	R/W	dword
474A-475F	Tenant 16 real-time energy	R/W	dword
4760-4775	Tenant 17 real-time energy	R/W	dword
4776-478B	Tenant 18 real-time energy	R/W	dword
Three phase energy data under the wiring setting 2, 3, 4, three phase three wire A/B/ C phase data has no meaning under the wirng setting 3.Single phase three line tenants have no Phase C data under the wiring setting 4.			
4800-4801	Tenant 1 Phase A real-time energy	R/W	dword
4802-4803	Tenant 1 Phase B real-time energy	R/W	dword
4804-4805	Tenant 1 Phase C real-time energy	R/W	dword
4806-4807	Tenant 1 System real-time energy	R/W	dword
4808-4809	Tenant 1 this month system TOU energy (Total)	R/W	dword
480A-480B	Tenant 1 this month system TOU energy (Tariff 1)	R/W	dword
480C-480D	Tenant 1 this month system TOU energy (Tariff 2)	R/W	dword
480E-480F	Tenant 1 this month system TOU energy (Tariff 3)	R/W	dword
4810-4811	Tenant 1 this month system TOU energy (Tariff 4)	R/W	dword
4812-4813	Tenant 1 this month system TOU energy (Total)	R	dword
4814-4815	Tenant 1 this month system TOU energy (Tariff 1)	R	dword
4816-4817	Tenant 1 prior month system TOU energy (Tariff 2)	R	dword
4818-4819	Tenant 1 prior month system TOU energy (Tariff 3)	R	dword
481A-481B	Tenant 1 prior month system TOU energy (Tariff 4)	R	dword
481C-481D	Tenant 1 this month Phase A energy (Total)	R/W	dword
481E-481F	Tenant 1 this month Phase A energy (Tariff 1)	R/W	dword
4820-4821	Tenant 1 this month Phase A energy (Tariff 2)	R/W	dword
4822-4823	Tenant 1 this month Phase A energy (Tariff 3)	R/W	dword

4824-4825	Tenant 1 this month Phase A energy (Tariff 4)	R/W	dword
4826-4827	Tenant 1 this month Phase B energy (Total)	R/W	dword
4828-4829	Tenant 1 this month Phase B energy (Tariff 1)	R/W	dword
482A-482B	Tenant 1 this month Phase B energy (Tariff 2)	R/W	dword
482C-482D	Tenant 1 this month Phase B energy (Tariff 3)	R/W	dword
482E-482F	Tenant 1 this month Phase B energy (Tariff 4)	R/W	dword
4830-4831	Tenant 1 this month Phase C energy (Total)	R/W	dword
4832-4833	Tenant 1 this month Phase C energy (Tariff 1)	R/W	dword
4834-4835	Tenant 1 this month Phase C energy (Tariff 2)	R/W	dword
4836-4837	Tenant 1 this month Phase C energy (Tariff 3)	R/W	dword
4838-4839	Tenant 1 this month Phase C energy (Tariff 4)	R/W	dword
483A-483B	Tenant 1 prior month Phase A TOU energy (Total)	R	dword
483C-483D	Tenant 1 prior month Phase A TOU energy (Tariff 1)	R	dword
483E-483F	Tenant 1 prior month Phase A TOU energy (Tariff 2)	R	dword
4840-4841	Tenant 1 prior month Phase A TOU energy (Tariff 3)	R	dword
4842-4843	Tenant 1 prior month Phase A TOU energy (Tariff 4)	R	dword
4844-4845	Tenant 1 prior month Phase B TOU energy (Total)	R	dword
4846-4847	Tenant 1 prior month Phase B TOU energy (Total)	R	dword
4848-4849	Tenant 1 prior month Phase B TOU energy (Tariff 2)	R	dword
484A-484B	Tenant 1 prior month Phase B TOU energy (Tariff 3)	R	dword
484C-484D	Tenant 1 prior month Phase B TOU energy (Tariff 4)	R	dword
484E-484F	Tenant 1 prior month Phase C TOU energy (Total)	R	dword
4850-4851	Tenant 1 prior month Phase C TOU energy (Tariff 1)	R	dword
4852-4853	Tenant 1 prior month Phase C TOU energy (Tariff 2)	R	dword
4854-4855	Tenant 1 prior month Phase C TOU energy (Tariff 3)	R	dword

Demand, Max Demand and Max Demand Occurance

Demand parameter includes Power and Current realtime demand, Max Demand, Max Demand Occurance. Power Demand includes Prediction Demand. AcuRev 2010 Basic does not have current demand. Real-time demand, Max Demand and Prediction Demand data types are floating, each parameter uses 2 registers, 4 bytes. High bytes are followed by low bytes. The max demand occurance is an integer, using 3 bytes. Function Code 03: Read.

Address	Parameter	Property	Data Range	Data Type
When the wiring setting is three phase 3 wire, inline A/B/C Power Demand, Prediction Demand, Max Demand and Max Power Demand Occurance do not have meaning, but the inline total does have the meaning. Inline total and A/B/C Current Demand, Max Current Demand and Max Current Demand Occurance have meaning. When the wiring setting is single phase 3 wire, inline Phase C Current Demand, Max Current Demand, and its occurance, Power Demand, Power Prediction Demand, Max Power Demand and its occurance do not have meaning.				
4B00-4B01	Pin-s-dema inline system demand	R		float
4B02-4B03	PinS inline system power demand prediction	R		float
4B04-4B05	Pin-s-dema-max inline system demand	R		float
4B06-4B08	Pin-s-time inline system demand peak	R	Year, Month, Day, Hour, Minute, Second	word
4B09-4B0A	IL1-dema(Phase A inline current demand)	R		float
4B0B-4B0C	IL1-dema-max(Phase A inline max current demand)	R		float
4B0D-4B0F	IL1-time(Phase A inline max current demand occurance)	R	Year, Month, Day, Hour, Minute, Second	word
4B10-4B11	IL2-dema(Phase B inline current demand)	R		float
4B12-4B13	IL2-dema-max(Phase B inline max current demand)	R		float
4B14-4B16	IL2-time(Phase B inline max current demand occurance)	R	Year, Month, Day, Hour, Minute, Second	word
4B17-4B18	IL3-dema(Phase C inline current demand)	R		float

4B19-4B1A	IL3-dema-max(Phase C inline max current demand)	R		float
4B1B-4B1D	IL3-time(Phase C inline max current demand occurance)	R	Year, Month, Day, Hour, Minute, Second	word
4B1E-4B1F	Pin-A-dema inline Phase A power demand	R		float
4B20-4B21	PinA inline Phase A Power Demand Prediction	R		float
4B224B23	Pin-A-dema-max inline Phase A power demand	R		float
4B244B26	Pin-A-time inline Phase A Max Power Demand	R	Year, Month, Day, Hour, Minute, Second	word
4B274B28	Pin-B-dema inline Phase B power demand	R		float
4B294B2A	PinB inline Phase B power demand prediction	R		float
4B2B-4B2C	Pin-B-dema-max inline Phase B power demand	R		float
4B2D-4B2F	Pin-B-time inline Phase B Power Demand Peak	R	Year, Month, Day, Hour, Minute, Second	word
4B30-4B31	Pin-C-dema inline Phase C demand	R		float
4B32-4B33	PinC inline Phase C Power Demand Prediction	R		float
4B34-4B35	Pin-C-dema-max Phase C Power Demand	R		float
4B36-4B38	Pin-C-time inline Phase C Power Demand Max Happening Time	R	Year, Month, Day, Hour, Minute, Second	word
The following is under wiring setting 0 and 1, the demand data are for 18 tenants, 18 blocks				
4C00-4C01	I1_dema Tenant 1 Current Demand	R		float
4C02-4C03	I1-dema-max Tenant 1 Current Demand Max	R		float
4C04-4C06	I1-dema-max-time Tenant 1 Max Demand Happening Time	R	Year, Month, Day, Hour, Minute, Second	word
4C07-4C08	P1-dema Tenant 1 Power Demand	R		float
4C09-4C0A	P1-pred Tenant 1 Power Demand Prediction	R		float
4C0B-4C0C	P1-demamax Tenant 1 Power Demand Max	R		float
4C0D-4C0F	P1-dema-max-time Tenant 1 Power Deman Max Happening Time	R	Year, Month, Day, Hour, Minute, Second	word
4C10-4C1F	Tenant 2 Demand Data	R	Same as Tenant 1	
4C20-4C2F	Tenant 3 Demand Data	R	Same as Tenant 1	
4C30-4C3F	Tenant 4 Demand Data	R	Same as Tenant 1	

4C40-4C4F	Tenan 5 Demand Data	R	Same as Tenant 1	
4C50-4C5F	Tenant 6 Demand Data	R	Same as Tenant 1	
4C60-4C6F	Tenant 7 Demand Data	R	Same as Tenant 1	
4C70-4C7F	Tenant 8 Demand Data	R	Same as Tenant 1	
4C80-4C8F	Tenant 9 Demand Data	R	Same as Tenant 1	
4C90-4C9F	Tenant 10 Demand Data	R	Same as Tenant 1	
4CA0-4CAF	The 11th tenant demand	R	Same as Tenant 1	
4CB0-4CBF	The 12th tenant demand	R	Same as Tenant 1	
4CC0-4CCF	The 13th tenant demand	R	Same as Tenant 1	
4CD0-4CDF	The 14th tenant demand	R	Same as Tenant 1	
4CE0-4CEF	The 15th tenant demand	R	Same as Tenant 1	
4CF0-4CFF	The tenant 16 Demand	R	Same as Tenant 1	
4D00-4D0F	The tenant 17 Demand	R	Same as Tenant 1	
4D10-4D1F	The tenant 18 Demand	R	Same as Tenant 1	
The following setting modes are under the wiring settings of 2, 3, 4.Wiring Setting 2 includes A/B/C phase data. When the wiring setting is set as 3, Phase A/B/C Power Demand, Power Demand Prediction, Power Demand Max and its time of occurence do not have meaning, but Current Demand and Current Demand Max and its time of occurence do have meaning. When it is under wiring setting 4, Phase C Current Demand and Current Demand Max time of occurence, Power Demand, Power Demand Prediction, Power Demand Max and its time of occurence do not have meaning.				
4E00-4E01	Ps1-dema Tenant 1 Power Demand	R		float
4E02-4E03	Ps1-pred Tenant 1 Power Demand Prediction	R		float
4E04-4E05	Ps1-dema-max Tenant 1 Power Demand Max	R		float
4E06-4E08	Ps1-dema-max-time Tenant 1 Power Demand Max time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E09-4E0A.	Tenant 1 Phase A Current Demand	R		float
4E0B-4E0C	Tenant 1 Phase A Current	R		float
4E0D-4E0F	Tenant 1 Max Current Demand time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E10-4E11	Tenant 1 Phase B Current Demand	R		float
4E12-4E13	Tenant 1 Phase B Current Max Demand	R		float

4E14-4E16	Tenant 1 Phase B Current Max Demand time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E17-4E18	Tenant 1 Phase C Current Demand	R		float
4E19-4E1A	Tenant 1 Phase C Current Demand Max	R		float
4E1B-4E1D	Tenant 1 Phase C Current Demand Max time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E1E-4E1F	Tenant 1 Phase A Power Demand	R		float
4E20-4E21	Tenant 1 Phase A Power Demand Prediction	R		float
4E22-4E23	Tenant 1 Phase A Power Demand Max	R		float
4E24-4E26	Tenant 1 Phase A Power Demand Max time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E27-4E28	Tenant 1 Phase B Power Demand	R		float
4E29-4E2A	Tenant 1 Phase B Power Demand Prediction	R		float
4E2B-4E2C	Tenant 1 Phase B Power Demand Max	R		float
4E2D-4E2F	Tenant 1 Phase B Power Demand Max time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E30-4E31	Tenant 1 Phase C Power Demand	R		float
4E32-4E33	Tenant 1 Phase C Power Demand Prediction	R		float
4E34-4E35	Tenant 1 Phase C Power Demand Max	R		float
4E36-4E38	Tenant 1 Phase C Power Demand Max time of occurence	R	Year, Month, Day, Hour, Minute, Second	word
4E39-4E71	Tenant 2 Power Demand	R	Same as Tenant 1	float
4E72-4EAA	Tenant 3 Power Demand	R	Same as Tenant 1	float
4EAB-4EE3	Tenant 4 Power Demand	R	Same as Tenant 1	float
4EE4-4F1C	Tenant 5 Power Demand	R	Same as Tenant 1	float
4F1D-4F55	Tenant 6 Power Demand	R	Same as Tenant 1	float

Power Quality

The Power Quality parameters include Unbalance Factor, Total Harmonic Distortion and 2nd-31st harmonic data. Different wiring settings lead to different parameters. AcuRev 2010 does not measure power quality parameters. The power quality parameter data type is floating point. Each parameter uses 4 bytes (high bytes followed by low bytes).

Function Code 03: read.

Address	Parameter	Property	Range	Data Type
The wiring setting 3(3LL)is for the line-to-line voltage parameters. Under the wiring setting 4 (Single Phase 3 wire), U3 parameters do not have meaning.				
5000	Voltage Unbalance Factor	R		word
5001	U1 or U12 THD-U1	R		word
5002	U2 or U23 THD-U2	R		word
5003	U3 or U31 THD-U3	R		word
5004	Voltage THD average	R		word
5005	U1 or U12 2nd harmonic	R		word
5006	U1 or U12 3rd harmonic	R		word
……	……	R		word
5022	U1 or U12 31st harmonic	R		word
5023	U2 or U23 2nd harmonic	R		word
5029	U2 or U23 3rd harmonic	R		word
……	……	R		word
5040	U2 or U23 31st harmonic	R		word
5041	U3 or U31 2nd harmonic	R		word
5042	U3 or U31 3rd harmonic	R		word
……	……	R		word
505e	U3 or U31 31st harmonic	R		word
The following are power quality parameters under the wiring settings of 0 and 1 with 18 data blocks in total.				
5100	1st tenant current THD-I1	R		word
5101	1st tenant current 2nd harmonic	R		word

……	……	R		word
511E	1st tenant current 31st harmonics	R		word
511F-513D	2nd tenant current harmonics	R	Same as tenant 1	word
513E-515C	3rd tenant current harmonics	R	Same as tenant 1	word
515D-517B	4th tenant current harmonics	R	Same as tenant 1	word
517C-519A	5th tenant current harmonics	R	Same as tenant 1	word
519B-51B9	6th tenant current harmonics	R	Same as tenant 1	word
51BA-51D8	7th tenant current harmonics	R	Same as tenant 1	word
51D9-51F7	8th tenant current harmonics	R	Same as tenant 1	word
51F8-5216	9th tenant current harmonics	R	Same as tenant 1	word
5217-5235	10th tenant current harmonics	R	Same as tenant 1	word
5236-5254	11th tenant current harmonics	R	Same as tenant 1	word
5255-5273	12th tenant current harmonics	R	Same as tenant 1	word
5274-5292	13th tenant current harmonics	R	Same as tenant 1	word
5293-52B1	14th tenant current harmonics	R	Same as tenant 1	word
52B2-52D0	15th tenant current harmonics	R	Same as tenant 1	word
52D1-52EF	16th tenant current harmonics	R	Same as tenant 1	word
52F0-530E	17th tenant current harmonics	R	Same as tenant 1	word
530F-532D	18th tenant current harmonics	R	Same as tenant 1	word
The following are power quality parameters under the wiring settings of 2, 3, 4 with 6 Data Blocks in total. Phase C data has no meaning when the wiring setting is 4.				
5600	1st tenant current unbalance	R		word
5601	1st tenant Phase A current THD			word
5602	1st tenant Phase A current harmonics	R		word
	……	R		word
561F	1st tenant Phase A current 31st harmonics	R		word
5620	1st tenant Phase B current THD			word
5621	1st tenant Phase B current 2nd harmonic			word
	……			
563E	1st tenant Phase B 31st harmonics			word

563F	1st tenant Phase C current THD			word
5640	1st tenant Phase C current 2nd harmonic			word
	……			
565D	1st tenant Phase C current 31st haromnic			word
565E-56BB	2nd tenant harmonics	R	Same as Tenant 1	word
56BC-5719	3rd tenant harmonics	R	Same as Tenant 1	word
571A-5777	4rd tenant harmonics	R	Same as Tenant 1	word
5778-57D5	5rd tenant harmonics	R	Same as Tenant 1	word
57D6-5833	6rd tenant harmonics	R	Same as Tenant 1	word

Over/Under Limit Alarm

A High Byte indicates an alarming channel number 1-10.Low Byte: bit0 = 1 indicates alarming, bit0 = 0 indicates restoration.

Only one alarming record can be read each time.The reading will be implemented via the current alarming record number, and it can save up to 20 alarming records.

Function Code 03 is to read. Function Code 10 is to write.

Address	Parameter	Property	Range	Default	Data Type
5B00	Group 1: Alarm State	R			integer
5B01	Group 1: Parameter Number	R	0-220		integer
5B02	Group 1: Over limit or restoration value	R			integer
5B03-5B09	Group 1: Happening Time	R	Year, Month, Day, Hour, Minute, Second, Millisec ond		integer
5B0A	Newest alarm record number	R	1-10, 0 indicates no alarm record	0	integer

5B0B	Alarm Record Number currently being read	R/W	1-10	1	integer

System Event Log

Records event happening and event. Please refer to Chapter 4 for details.

Only one record can be read every time via current event number, it can be saved up to 100 records.

Function Code 03 is to read. Function Code 10 is to write.

Address	Parameter	Property	Range	Default	Data Type
5C00-5C05	Event Happening Time	R	Year, Month, Day, Hour, Minute, Second		word
5C06	Event Marking		1-16 indicating 1-16 events		word
5C07	Newest Event Number		1-100, 0 indicates null	0	word
5C08	Event number currently being read	R/W	1-100	1	word

SOE Record

When an event happens, SOE records the DI state and its time of occurence. Each time only one SOE record can be read, via current SOE record setting, it can save up to 20 SOE records.

Function Code 03 is to read, Function Code 10 is to write.

Address	Parameter	Property	Range	Default	Data Type
5D00	DI SOE first record: Year	R			word
5D01	DI SOE first record: Month	R			word
5D02	DI SOE first record: Day	R			word
5D03	DI SOE first record: Hour	R			word
5D04	DI SOE first record: Minute	R			word
5D05	DI SOE first record: Second	R			word
5D06	DI SOE first record: millisecond high byte	R			word
5D07	DI SOE first record: millisecond low byte	R			word
5D08	DI SOE 1st record: status	R	Bit0-7 indicates the 8 channel's DI statue.1 means ON, 0 means OFF		word
5D09	Newest SOE record number	R	1-20, 0 means null		word
5D0A	SOE record number being read	R/W	1-20		word

DI Pulse Counter and Value

DI pulse counter remains when power is off. When DI type is changed from Pulse Counter to Signal Detection, the pulse number still reamins. Function Code 03 is to read.

Address	Parameter	Property	Range	Default	Data Type
5E00-5E01	DI1 Pulse Counter	R			dword
5E02-5E03	DI2 Pulse Counter	R			dword
5E04-5E05	DI3 Pulse Counter	R			dword
5E06-5E07	DI4 Pulse Counter	R			dword
5E08-5E09	DI5 Pulse Counter	R			dword

5E0A-5E0B	DI6 Pulse Counter	R			dword
5E0C-5E0D	DI7 Pulse Counter	R			dword
5E0E-5E0F	DI8 Pulse Counter	R			dword
5E10-5E11	DI1 Pulse Counter	R			float
5E12-5E13	DI2 Pulse Counter	R			float
5E14-5E15	DI3 Pulse Counter	R			float
5E16-5E17	DI4 Pulse Counter	R			float
5E18-53E19	DI5 Pulse Counter	R			float
5E1A-5E1B	DI6 Pulse Counter	R			float
5E1C-5E1D	DI7 Pulse Counter	R			float
5E1E-5E1F	DI8 Pulse Counter	R			float

DI State Parameter

1-8 DI status. Function Code 02 to read.

Address	Parameter	Property	Range	Default	Data Type
0000	DI1	R	1=ON, 0=OFF	0	bit
0001-0007	DI2-DI8	R	1=ON, 0=OFF	0	bit

RO state

1-4 channel Relay Output. Function Code 01 to read; function code 05 to write.

Address	Parameter	Property	Range	Default	Data Type
0000	RO1	R/W	1=ON, 0=OFF	0	bit
0001	RO2	R/W	1=ON, 0=OFF	0	bit
0002	RO3	R/W	1=ON, 0=OFF	0	bit
0003	RO4	R/W	1=ON, 0=OFF	0	bit

Others

a. Clear to 0 (Address 103bH):

Bit7	Bit6	Bit5	Bit3	Bit2	Bit1	Bit0
1 to clear	1 to clear	1 to clear	1 to clear	1 to clear	1 to clear	1 to clear
Reserved	Clear battery runtime	Clear device runtime	Clear Event	Clear SOE Record	Clear Demand	Clear TOU Energy

b. Error Word 1 (Address 1090H):

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	1	1	1	0	1	1	1
Weekend Schedule Setting Error	Holiday Setting Error	Holiday Number Exceeds	Season Setting Error	Season Number Exceeds	Schedule Table Exceeds	Schedule Setting Error	Tariff Exceeds

Error Word 2 (Address 1091H)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	1	1	1	0	1	1	1
Schedule 8 Error	Schedule 7 Error	Schedule 6 Error	Schedule 5 Error	Schedule 4 Error	Schedule 3 Error	Schedule 2 Error	Schedule 1 Error

c. Weekend (Address 1097H)

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
0	1: Work 0: Off						
Reserved	Saturday	Friday	Thursday	Wednesday	Tuesday	Monday	Sunday

Appendix E Revision History

Version	Date	Description
V1.01	2012.04.20	1st edition
V1.02	2012.08.08	P95:Add the range of measured values

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