

AcuRev 4100 Series
Multi-Channel Branch Circuit Submeter
User Manual





ACCUENERGY

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Please read this manual carefully before installation, operation, and maintenance of the AcuRev 4100 Multi-Channel Branch Circuit Submeter.

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Safety Notice

ELECTRIC SHOCK DANGER SAFETY WARNING

Please read this document carefully before the installation, operation, and maintenance of the AcuRev 4100 Multi-Channel Branch Circuit Submeter.

If the equipment is used in a manner not specified by Accuenergy, the protection provided by the equipment may be impaired.

Prior to maintenance and repair, the equipment must be de-energized and grounded. All maintenance work must be performed by qualified, competent, accredited professionals who have received formal training and have experience with high voltage / current devices.

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

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

DISCONNECT DEVICE: The following part serves as the designated disconnect device for this equipment.

A SWITCH OR CIRCUIT-BREAKER MUST BE INCLUDED IN THE INSTALLATION.

THE SWITCH MUST BE IN CLOSE PROXIMITY TO THE EQUIPMENT AND WITHIN EASY REACH OF THE OPERATOR. THE SWITCH SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE EQUIPMENT.

Important Symbols

The following symbols in this manual are used to provide warnings of danger or risk during the installation and operation of the meter.



ELECTRIC HAZARD SYMBOL: Indicates information about procedures that must be followed to reduce the risk of electric shock and danger to personal safety.



WARNING SYMBOL: Information about a hazardous circumstance, if not considered, may result in injury or death.



INFO SYMBOL An advanced notice providing additional information before an action is taken by the user.

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Chapter 1: Introduction

1.1 Meter Overview

The AcuRev 4100 Series is a high-density multi-channel branch circuit submeter designed for revenue-grade metering of multiple loads. Capable of measuring up to 24 current inputs, it provides ANSI C12.20 Class 0.2 and IEC 62053-22 Class 0.2S accuracy. The AcuRev 4100 is engineered for real-time energy consumption monitoring and high-precision power quality analysis in commercial, industrial, and residential facilities.

1.2 Areas of Application

- Multi-Tenant Submetering/Billing
- Commercial Complexes/Malls
- Apartment Buildings/Condominiums
- Hospitals/Public Services
- Hotels/Office Buildings
- Data Centers
- LEED Projects
- Branch Circuit Monitoring
- Railway and Subway Systems
- Energy Management Systems
- Industrial and Utility Applications

1.3 Key Features

Multi-Circuit Measurement

Features 24 current inputs and supports 24 single-phase, 12 two-phase, 8 three-phase circuits, or custom configurations with combinations of different circuits.

Revenue Grade Accuracy

Delivers revenue-grade accuracy that meets ANSI C12.20 Class 0.2 and IEC 62053-22 Class 0.2S standards for active energy measurement.

Power Quality Monitoring

Detects power quality events and triggers waveform capture, configurable up to 128 samples per cycle, with a total of 2560 samples captured before and after the trigger.

On-Board I/O Functions

- 8 digital outputs configurable for event/alarm indication or pulse output.
- 4 digital inputs configurable for status monitoring, SOE logging, or pulse input.
- 2 relay outputs configurable for event/alarm indication or relay control.

Flexible Wiring Configuration

- Allows forward or reverse configuration to correct reversed current input connections.
- Software-configurable current inputs enable wiring remapping to logical channels allowing flexible correction of wiring errors.
- Each current input can be paired with any voltage input (Va, Vb, Vc, Vac, Vbc, or Vca) for flexible power calculation and energy accumulation.
- Supports 12 user-defined channels, each capable of mapping 1 to 3 inputs for power and energy calculations, offering flexible wiring options.

Data Logging with Built-In Memory Storage

Dedicated 110 MB memory of 128 MB onboard memory to support 3 data loggers and 1 trend logger that can be independently configured for periodic measurement logging.

Multi-Protocol Communication Support

Features built-in RS485 interfaces for Modbus RTU and BACnet MS/TP, along with dual Ethernet ports for Modbus TCP communication.

Alarm Monitoring

Supports 20 alarm groups, monitoring up to 40 parameters with logic combinations, and stores up to 200 alarm logs.

Multi-Tariff Time of Use (TOU)

Supports up to 4 tariffs (sharp, peak, valley, and normal) with 14 schedules, 14 segments, weekend settings, and a 10-year holiday calendar for regional billing.

Expansion Modules

The communication module adds 32 GB of non-volatile memory for energy and power quality data storage, supporting multiple industrial protocols including Modbus TCP, AcuCloud, NTP, SMTP, Waveform Post, Remote Access, HTTPS, FTP, SFTP, MQTT, SNMP, dual Ethernet, and Wi-Fi.

The AcuIOM Series I/O module extends input and output functionality with additional DI, DO, RO, AI, and AO.

Human-Machine Interface (HMI)

An on-board display for real-time data visualization and device configuration.

Chapter 2: Installation

AcuRev 4100 Series Meter Considerations Before Installation



ELECTRIC HAZARD

The installation must be performed by qualified, competent, accredited professionals who have received formal training, and have experience with high-voltage and current devices. Appropriate safety wear including gloves, glass, arc flash suit is mandatory to ensure safe installation.

During normal meter operation, caution should be exercised as high voltage may be present at terminal blocks, current and potential transformer connection nodes, and other related circuits.

All primary and secondary circuits may contain lethal current and voltage. Contact with current channels must be avoided.

AcuRev 4100 and I/O modules cannot be installed on the primary side of transformers or where VA limitations are present. It can only be installed on the secondary side of the circuit. Avoid contact with meter terminals after the installation is complete.

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

Do not perform high voltage tests or insulation experiments to the output, input, or communication terminals.

The use of shorting blocks and fuses is recommended.

Use a dry cloth to wipe the meter if necessary.



WARNING

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

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 easily accessible. The switch is regarded as part of the breaking device.

Please read this chapter carefully before beginning installation.

2.1 Appearance and Dimensions

The AcuRev 4100 Series has an LCD display located on the front and DIN rail mount on the rear. The following figures provide the view of AcuRev 4100 Series.

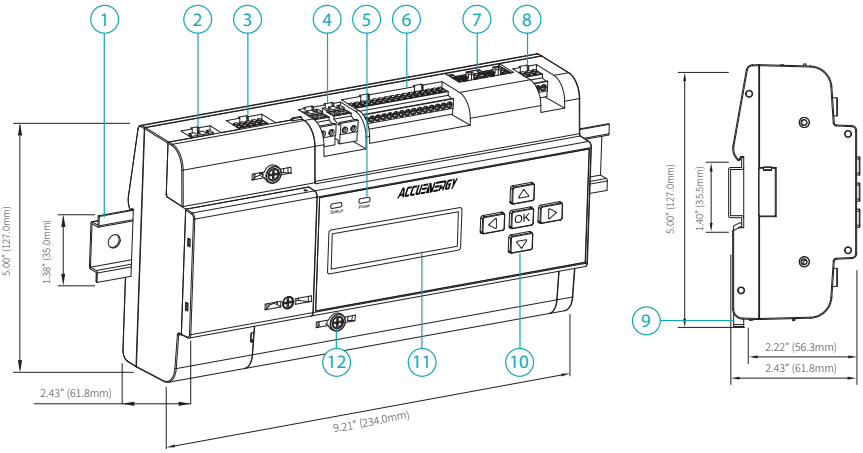


Figure 2-1 AcuRev 4100 Series Appearance and Dimensions

Table 2-1 AcuRev 4100 Series Part Number and Description

Number	Description
1)	DIN rail used for device mounting.
2)	Power supply.
3)	4-channel digital input port.
4)	2-channel relay output port.
5)	Status and pulse indication.
6)	8-channel digital output port.
7)	Dual Ethernet ports.
8)	RS485 communication port.
9)	Clips to attach AcuRev 4100 to the DIN rail.
10)	Five keys used to select and display settings.
11)	Display and parameter setting are performed via the HMI.
12)	Three screws used to secure the terminal covers.

2.2 Installation Methods

Environmental

Before installation, please check the environment, temperature, and humidity to ensure the AcuRev 4100 Series meter is being placed where it will not be damaged.

Temperature

The AcuRev 4100 operating temperature range is -25°C to 70°C (-13°F to 158°F). Exceeding this temperature range will cause damage to the meter.

Please note that it can negatively influence the meter's lifespan if the meter operates in extremely high or extremely low temperatures.

The AcuRev 4100 storage temperature range is -40°C to 85°C (-40°F to 185°F).

Humidity

The AcuRev 4100 operates within a range of 0% to 95% relative humidity, non-condensing.

Location

The AcuRev 4100 should be installed in a dry and dust-free environment. Avoid exposing the meter to excessive heat, radiation, and high electrical noise sources.

Installation Steps

The AcuRev 4100 is rail-mounted and designed for a standard 35 mm (1.38") DIN rail.

1. Pull out the two clips at the bottom of the meter.
2. Place the meter onto the DIN rail, ensuring the rail fits tightly against the back of the meter. Push the two clips back in until a clicking sound is heard, indicating the meter is securely mounted.

INFO When installing the meter in switchboards or panel boards, sufficient clearance must be maintained at the front, rear, top, and bottom of the device to facilitate wiring and removal.

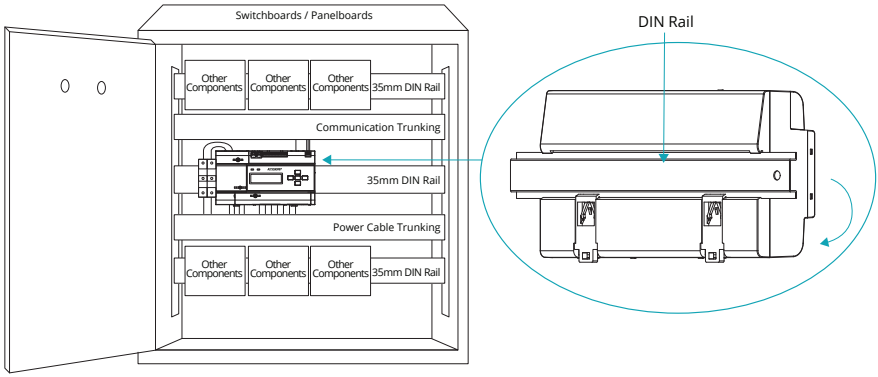


Figure 2-2 Meter Installation Method

INFO Power cables and communication cables must not be routed in the same trunking to prevent EMI.

2.3 Wiring Configuration

2.3.1 Terminals

The upper section of the AcuRev 4100 has the power supply, digital input, seal button, relay output, digital output, Ethernet ports, and RS485 terminals and the lower section includes the voltage input and current input terminals.

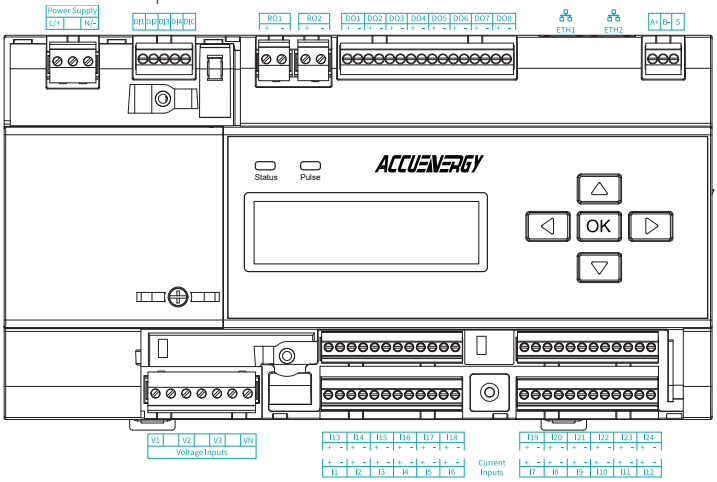


Figure 2-3 Meter Terminals

Table 2-2 Product Terminals

Terminal Name	Function	Terminal Type	Terminal Aperture	Screw Torque
V1, V2, V3, VN	Three-phase Voltage Input Port	Plug-in	2.5 mm²	0.66 N·m
L/+, N/-	Power Input Port	Plug-in	2.5 mm²	0.66 N·m
R01, R02	2 Channel Relay Output Port	Plug-in	2.5 mm²	0.66 N·m
A, B, S	RS485 Communication Port	Plug-in	1.5 mm²	0.2 N·m
DI1, DI2, DI3, DI4	4 Channel Digital Input Port	Plug-in	1.5 mm²	0.2 N·m
DO1, DO2, DO3, DO4, DO5, DO6, DO7, DO8	8 Channel Digital Output Port	Plug-in	1.5 mm²	0.2 N·m
I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, I15, I16, I17, I18, I19, I20, I21, I22, I23, I24	24 Channel Current Input Port	Plug-in	1.5 mm²	0.2 N·m

INFO It is recommended to use 0.5 - 1.5 mm² copper conductor for current input, digital input and digital output terminals.

INFO It is recommended to use 1 - 2.5 mm² copper conductor for voltage input and power input terminals.

2.3.2 Wiring Methods

The AcuRev 4100 can be used to measure single-phase, two-phase, and three-phase electrical circuits.

2.3.2.1 Power Supply Wiring

The AcuRev 4100 supports both It is 100V-300VAC and 100-480VAC power supply. Please contact the manufacturer if a different power supply is required.

The power consumption of the meter is low during normal operation; therefore, the power supply can be either via a standalone power supply or a measured circuit.

A regulator is recommended where the voltage is not stabilized.

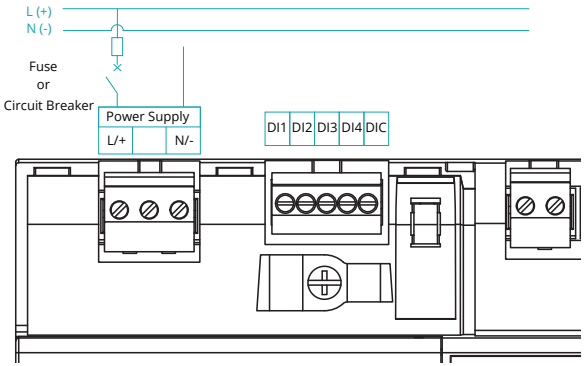


Figure 2-4 Power Supply Wiring

A fuse (1 A / 500 VAC) or a small-sized circuit breaker is mandatory for the AcuRev 4100 power supply. If a circuit breaker is utilized, it must be CE certified and comply with IEC 60947 standard.

2.3.2.2 Voltage Input Wiring

To connect the voltage input terminal, ensure that the input range is 60 VAC to 480 VAC (line-to-neutral) or 60 VAC to 830 VAC (line-to-line), CAT III. A 1 A / 500 VAC fuse should be used in the voltage input loop.

The voltage input wiring varies depending on the wiring method used.

2.3.2.3 Current Input Wiring

AcuRev 4100 supports up to 24 current inputs.

To connect the current input terminals:

1. Use a 3 × 0.5 mm (DIN 5264) screwdriver to loosen the terminal screw from the meter.
2. Insert the copper wire (16 AWG ~ 14 AWG) into the terminal. Fasten the screw to secure the wire.

The AcuRev 4100 supports five different current input wiring methods. The specific configurations are as follows:

1 Element 2 Wire

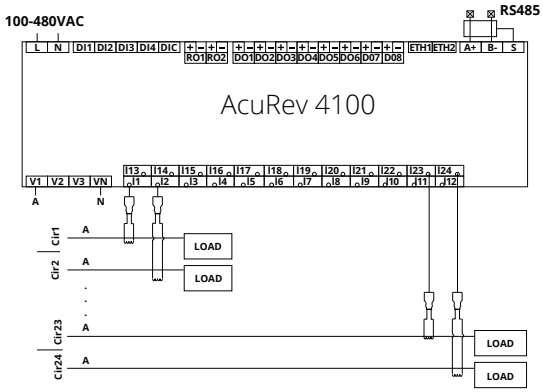


Figure 2-5 1 Element 2 Wire Connection

For 1 Element 2 Wire connection, the corresponding relationship between the user channel and phase A is shown in the following table.

Table 2-3 1 Element 2 Wire Connection and Phase Relation

User Channel	Phase A	Input Channel	Phase A	Input Channel	Phase A
Channel 1	I1	Channel 9	I9	Channel 17	I17
Channel 2	I2	Channel 10	I10	Channel 18	I18
Channel 3	I3	Channel 11	I11	Channel 19	I19
Channel 4	I4	Channel 12	I12	Channel 20	I20
Channel 5	I5	Channel 13	I13	Channel 21	I21
Channel 6	I6	Channel 14	I14	Channel 22	I22
Channel 7	I7	Channel 15	I15	Channel 23	I23
Channel 8	I8	Channel 16	I16	Channel 24	I24

2 Element 3 Wire 1 Phase

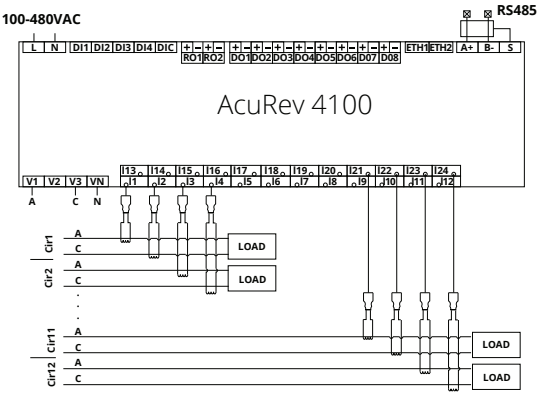


Figure 2-6 2 Element 3 Wire 1 Phase Connection

For 2 Element 3 Wire 1 Phase connection, the corresponding relationship between the user channel and phases A and C is shown in the following table.

Table 2-4 2 Element 3 Wire 1 Phase Connection and Phase Relation

User Channel	Phase A	Phase C
Channel 1	I1	I2
Channel 2	I3	I4
Channel 3	I5	I6
Channel 4	I7	I8
Channel 5	I9	I10
Channel 6	I11	I12
Channel 7	I13	I14
Channel 8	I15	I16
Channel 9	I17	I18
Channel 10	I19	I20
Channel 11	I21	I22
Channel 12	I23	I24

2 Element 3 Wire Delta

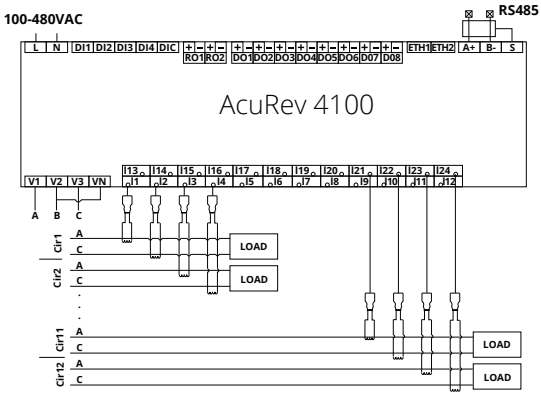


Figure 2-7 2 Element 3 Wire Delta Connection

For 2 Element 3 Wire Delta connection, the corresponding relationship between the user channel, phases AB, and BC is shown in the following table.

Table 2-5 2 Element 3 Wire Delta Connection and Phase Relation

User Channel	Phase AB	Phase BC
Channel 1	I1	I2
Channel 2	I3	I4
Channel 3	I5	I6
Channel 4	I7	I8
Channel 5	I9	I10
Channel 6	I11	I12
Channel 7	I13	I14
Channel 8	I15	I16
Channel 9	I17	I18
Channel 10	I19	I20
Channel 11	I21	I22
Channel 12	I23	I24

2 Element 3 Wire Network

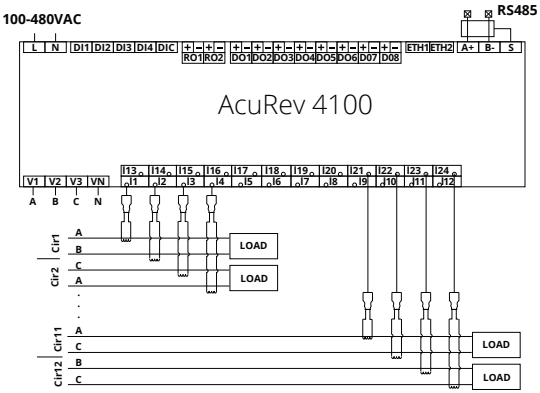


Figure 2-8 2 Element 3 Wire Network Connection

For 2 Element 3 Wire Network connection, the corresponding relationship between the user channel and phases A, B, and C is shown in the following table.

Table 2-6 2 Element 3 Wire Network Connection and Phase Relation

User Channel	Phase A	Phase B	Phase C	User Channel	Phase A	Phase B	Phase C
Channel 1	I1	I2		Channel 7	I13	I14	
Channel 2	I4		I3	Channel 8	I16		I15
Channel 3		I5	I6	Channel 9		I17	I18
Channel 4	I7	I8		Channel 10	I19	I20	
Channel 5	I10		I9	Channel 11	I22		I21
Channel 6		I11	I12	Channel 12		I23	I24

3 Element 4 Wire Wye

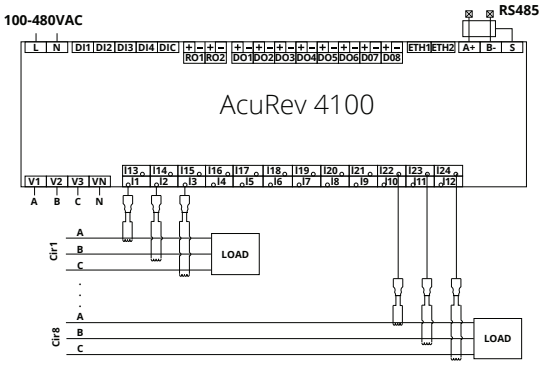


Figure 2-9 3 Element 4 Wire Wye Connection

For 3 Element 4 Wire Wye connection, the corresponding relationship between the user channel and phase A, B, and C is shown in the following table.

Table 2-7 3 Element 4 Wire Wye Connection and Phase Relation

User Channel	Phase A	Phase B	Phase C	User Channel	Phase A	Phase B	Phase C
Channel 1	I1	I2	I3	Channel 5	I13	I14	I15
Channel 2	I4	I5	I6	Channel 6	I16	I17	I18
Channel 3	I7	I8	I9	Channel 7	I19	I20	I21
Channel 4	I10	I11	I12	Channel 8	I22	I23	I24

2.3.2.4 RS485 and Ethernet Connection

For Modbus TCP communication, a 10/100 Mbit/s Cat5 Ethernet cable is recommended, and the connection can be programmed using IP configuration or DHCP.

For Modbus RTU communication via RS485 connection, the cable distance should not exceed 1200 m. Use a shorter cable when connecting multiple devices to the same network or use a higher baud rate. Use an RS232-to-RS485 converter if the master device has an RS232 port.

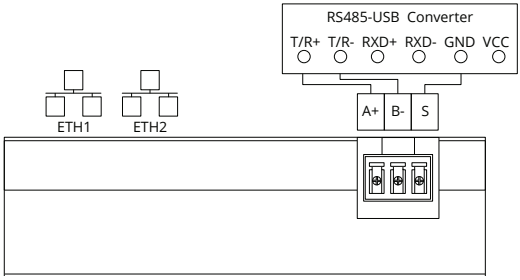


Figure 2-10 AcuRev 4100 RS485 Wiring

To improve RS485 communication quality:

- Use a shielded 22AWG cable.
- Minimize electrical noise with single-point earthing.
- Avoid T-type connection topology.
- Keep communication cables separated from electrical noise sources.
- RS485 supports daisy-chain wiring topology. Each RS485 bus segment supports up to 32 devices. 120 Ω / 0.25 W termination resistors must be connected at both ends of the segment.

Default Communication Settings:

- **RS485 port:**
  - Protocol: Modbus RTU (Enabled by Default)
  - Slave Address: 1
  - Baud Rate: 19,200
  - Parity: None1 (No parity, 1 stop bit)
- **Ethernet:**
  - Protocol: Modbus TCP (Enabled by Default)
  - IP Address: 192.168.1.254
  - Subnet Mask: 255.255.255.0
  - Gateway: 192.168.1.1

If the total number of devices exceeds 32, RS485 repeaters are required to extend the bus and ensure reliable communication.

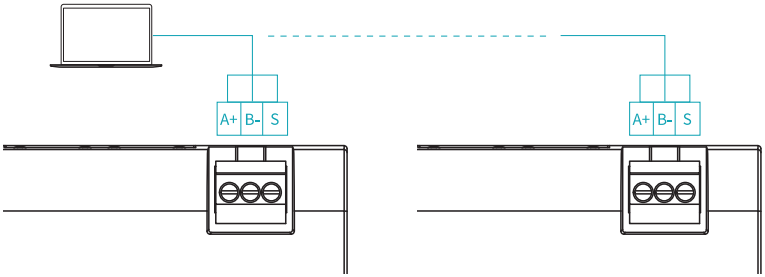


Figure 2-11 AcuRev 4100 Daisy-Chain Wiring

2.3.2.5. I/O Wiring

1. **Digital Input (DI) Wiring**

The DI input is an active input. The wiring diagram is as follows.

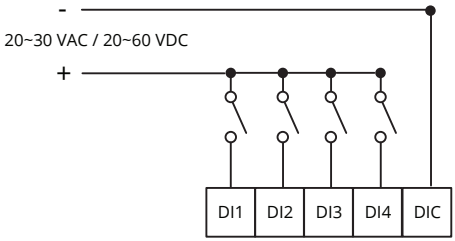


Figure 2-12 DI Wiring

2. **Digital Output (DO) Wiring**

The DO output port is designed with a Photo-MOS switch and can only drive low-power loads. Please pay attention to the load capacity. The wiring is shown in the diagram below.

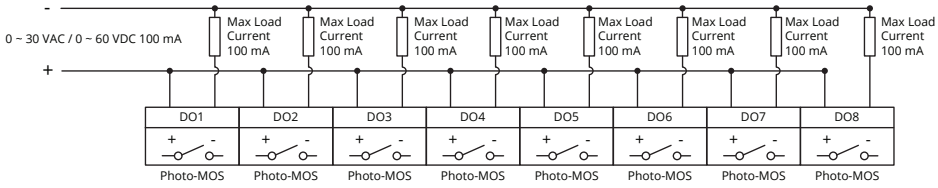


Figure 2-13 DO Wiring

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3. **Relay Output (RO) Wiring**

The RO output port is designed with a relay switch and can drive higher-power loads. The wiring is shown in the diagram below.

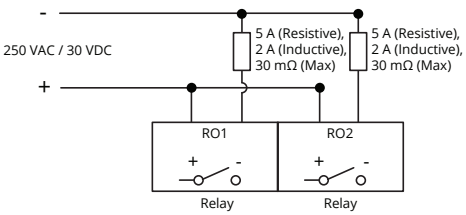


Figure 2-14 RO Wiring

Chapter 3: AcuRev 4100 Display Screen & Parameter Settings

3.1 HMI and Keys

The AcuRev 4100 meter consists of one LCD screen and five keys. Refer to Chapter 2, Section 2.1 for more details regarding the dimensions of the LCD display.

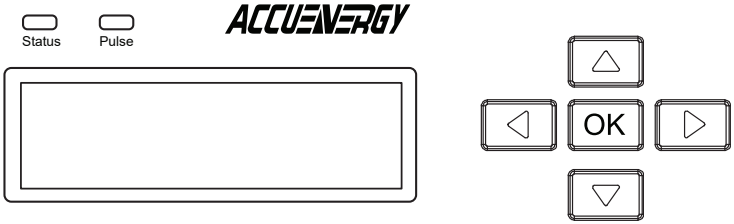


Figure 3-1 AcuRev 4100 HMI Display and Navigation Keys

Table 3-1 Navigation Keys Functions

Keys		Functions
△	Up	• Increment value in edit mode. • Navigate between menu items. • Switch to the previous page.
▽	Down	• Decrement value in edit mode. • Navigate between menu items. • Switch to the next page.
◁	Left	• Move the cursor to the left in edit mode. • Navigate between menu items. • Switch to the previous page.
▷	Right	• Move the cursor to the right in edit mode. • Navigate between menu items. • Switch to the next page.
OK	OK	• Confirm the settings. • Enter the next level of menu. • Enter the edit mode.
◁ ▷	Combine Buttons	Press the **Left** and **Right** key simultaneously for one second to exit the selected function.

After the AcuRev 4100 is powered on or reset, the manufacturer logo will appear first for 2 seconds. During these 2 seconds, no key input is allowed. After 2 seconds, the main menu will appear.

In the main menu screen, use the arrow keys **Left, Right, Up,** and **Down** keys to navigate to different menu options. Press **OK** to enter the selected menu option.

When entering either the **Settings** or **Network Settings** screens, users will be prompted to enter a password.

To enter the password, start by pressing the **Left** key to increment the first digit until the correct number is displayed. Press the **Right** key to navigate to the next adjacent digit. Continue until the numbers of all four digits have been selected. Push the **OK** key to confirm the password input.

By default, the password is set to **0000.**

If the password is forgotten, users are advised to contact Mod-Tronic Customer Support for assistance.

Main Menu



Figure 3-2 AcuRev 4100 Main Menu Screen

Table 3-2 Main Menu Divisions

Main Menu	Secondary Menu	Third Level Menu
Readings	Real-Time	A/B/C & System
		24 Input Channels
		12 User Channels
	Demand	A/B/C & System
		24 Input Channel
		12 User Channel
	Max demand	A/B/C & System
		24 Input Channel
		12 User Channel
	Energy	A/B/C & System
		24 Input Channel
		12 User Channel

Main Menu	Secondary Menu	Third Level Menu
Readings	Power Quality	A/B/C & System
		24 Input Channel
		12 User Channel
	Max/Min	A/B/C & System
		24 Input Channel
		12 User Channel
	I/O	Digital Input
		Digital Output
		Relay Output
Logs	PQ Event log	Set PQ Event Log Check Index
		Check PQ Event Log
	Alarm log	Set Alarm Log Check Index
		Check Alarm Log
	SOE log	Set SOE Log Check Index
		Check SOE Log
Settings	Basic	Refer to Chapter 3, Section 3.4 for all details of the menu
	Wiring	Input Channel
		User Channel
	I/O	Refer to Chapter 3, Section 3.4 for all details of the menu
	Communication	
	Time	
	Maintenance	
	Web2	
SysInfo	Manufacturer	Refer to Chapter 3, Section 3.5 for all details of the menu
	Product Model	
	Serial Number	
	Hardware Version	
	Bootloader Version	
	Firmware Version	
	Seal Status	
	MAC Address	
	Date & Time	
	Run Time	
	Load Time	

Main Menu	Secondary Menu	Third Level Menu
SysInfo	Web2 Firmware Version	Refer to Chapter 3, Section 3.5 for all details of the menu
	Web2 Serial Number	
	Web2 Eth1 Mac Address	
	Web2 Eth2 Mac Address	
	Web2 Wi-Fi Mac Address	

3.2 Readings Menu

3.2.1 Real-Time Screen and Operations

To enter the **Real-Time** screen, from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Real-time** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** or **Right** keys to query the real-time parameters of **A/B/C & System.**

Press the **Left** and **Right** keys simultaneously to exit the menu.

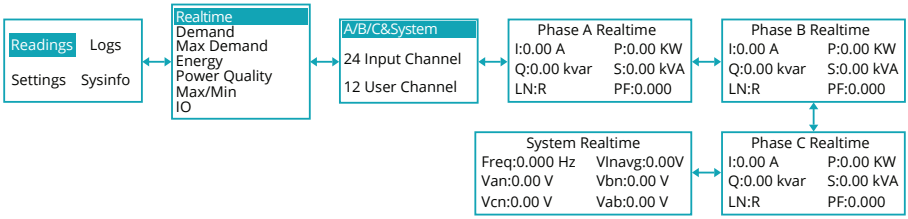


Figure 3-3 Real-Time Screen Sequence

Table 3-3 Real-Time Display Phase A Mapping

HMI Label	Parameter
I	Phase A Current
P	Phase A Active Power
Q	Phase A Reactive Power
S	Phase A Apparent Power
LN	Phase A Load Nature
PF	Phase A Power Factor

Phase B and C display mode is the same as Phase A.

Table 3-4 System Real-Time Display Mapping

HMI Label	Parameter
Freq	System Frequency
Van	Phase A Line-to-Neutral Voltage
Vbn	Phase B Line-to-Neutral Voltage
Vcn	Phase C Line-to-Neutral Voltage
Vlnavg	Average Line-to-Neutral Voltage
Vab	Phase AB Line-to-Line Voltage
Vbc	Phase BC Line-to-Line Voltage
Vca	Phase CA Line-to-Line Voltage
Vllavg	Average Line-to-Line Voltage
Vbn Ang	Phase B Line-to-Neutral Voltage Phase Angle
Vcn Ang	Phase C Line-to-Neutral Voltage Phase Angle
Iavg	System Average Current
P	System Active Power
Q	System Reactive Power
S	System Apparent Power
LN	System Load Nature
PF	System Power Factor

3.2.2 Demand Screen and Operations

To enter the **Demand** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Demand** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** or **Right** keys to query the Demand parameters. There are two pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

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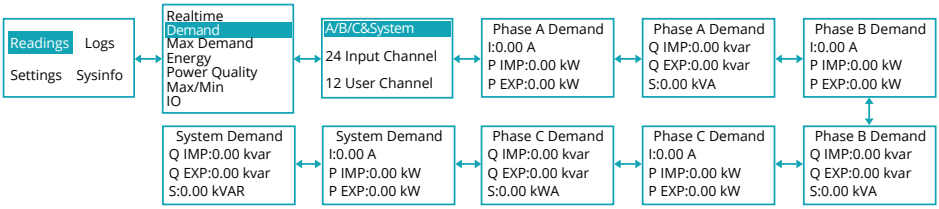


Figure 3-4 Demand Screen Sequence

Table 3-5 Demand Parameter Mapping

HMI Label	Parameter
I	Phase A Current Demand
P IMP	Phase A Import Active Power Demand
P EXP	Phase A Export Active Power Demand
Q IMP	Phase A Import Reactive Power Demand
Q EXP	Phase A Export Reactive Power Demand
S	Phase A Apparent Power Demand

Phase B and C demand parameters are the same as Phase A.

3.2.3 Max Demand Display and Operations

To enter the **Max Demand** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Max Demand** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** or **Right** keys to query the **Max Demand** parameters. There are six pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

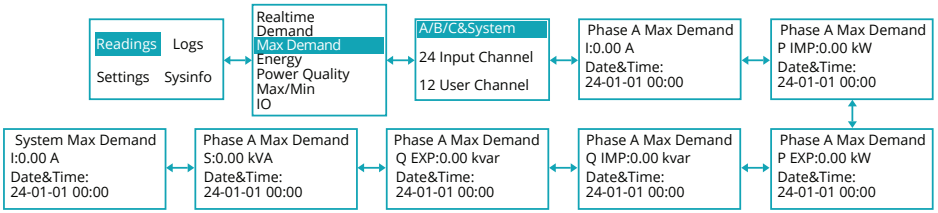


Figure 3-5 Max Demand Screen Sequence

Table 3-6 Max Demand Parameter Mapping

HMI Label	Parameter
I	Phase A Current Demand
P IMP	Phase A Import Active Power Demand
P EXP	Phase A Export Active Power Demand
Q IMP	Phase A Import Reactive Power Demand
Q EXP	Phase A Export Reactive Power Demand
S	Phase A Apparent Power Demand

Phase B and C max demand parameters are the same as Phase A.

3.2.4 Energy Display and Operations

To enter the **Energy** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Energy** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** or **Right** keys to query the **Energy** parameters. There are three pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

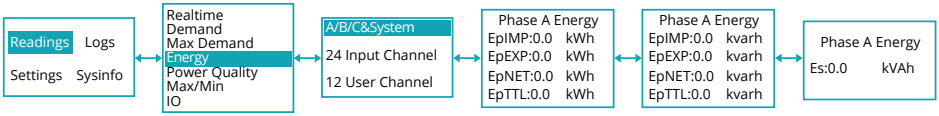


Figure 3-6 Energy Screen Sequence

Table 3-7 Energy Display Parameter Mapping

HMI Label	Parameter
EpIMP	Phase A Active Energy Import
EpEXP	Phase A Active Energy Export
EpNET	Phase A Active Energy Net
EpTTL	Phase A Active Energy Total
EqIMP	Phase A Reactive Energy Import
EqEXP	Phase A Reactive Energy Export
EqNET	Phase A Reactive Energy Net
EqTTL	Phase A Reactive Energy Total
Es	Phase A Apparent Energy

Phase B and C energy parameters are the same as Phase A.

3.2.5 Power Quality Display and Operations

To enter the **Power Quality** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Power Quality** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** and **Right** keys to query the **Power Quality** parameters. There are six pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

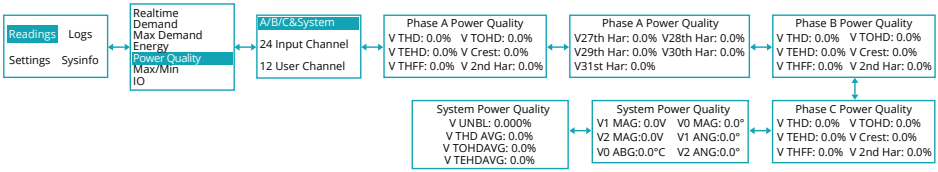


Figure 3-7 Power Quality Screen Sequence

Table 3-8 Voltage Power Quality Parameter Mapping

HMI Label	Parameter
V THD	Phase A Voltage Total Harmonic Distortion
V TOHD	Phase A Voltage Total Odd Harmonic Distortion
V TEHD	Phase A Voltage Total Even Harmonic Distortion
V Crest	Phase A Voltage Crest Factor
VTHFF	Phase A Voltage Telephone Harmonic Form Factor
V 2nd - 31st Har	Phase A Individual Voltage Harmonics
V THD	Phase B Voltage Total Harmonic Distortion
V TOHD	Phase B Voltage Total Odd Harmonic Distortion
V TEHD	Phase B Voltage Total Even Harmonic Distortion
V Crest	Phase B Voltage Crest Factor
VTHFF	Phase B Voltage Telephone Harmonic Form Factor
V 2nd - 31st Har	Phase B Individual Voltage Harmonics
V THD	Phase C Voltage Total Harmonic Distortion
V TOHD	Phase C Voltage Total Odd Harmonic Distortion
V TEHD	Phase C Voltage Total Even Harmonic Distortion
V Crest	Phase C Voltage Crest Factor
VTHFF	Phase C Voltage Telephone Harmonic Form Factor

HMI Label	Parameter
V 2nd - 31st Har	Phase C Individual Voltage Harmonics
V0 MAG	System Voltage Zero-Sequence Magnitude
V1 MAG	System Voltage Positive-Sequence Magnitude
V2 MAG	System Voltage Negative-Sequence Magnitude
V0 ANG	System Voltage Zero-Sequence Angle
V1 ANG	System Voltage Positive-Sequence Angle
V2 ANG	System Voltage Negative-Sequence Angle
V UNBL	System Voltage Unbalance / Voltage Unbalance Factor
V THD AVG	System Average Voltage Total Harmonic Distortion
V TOHD AVG	System Average Voltage Total Odd Harmonic Distortion
V TEHD AVG	System Average Voltage Total Even Harmonic Distortion

Table 3-9 Current Power Quality Parameter Mapping

HMI Label	Parameter
I THD	Input 1-24 Current Total Harmonic Distortion
I TOHD	Input 1-24 Current Total Odd Harmonic Distortion
I TEHD	Input 1 Current Total Even Harmonic Distortion
IKF	Input 1-24 Current K Factor
I 2nd - 31st Har	Input 1-24 Individual Current Harmonics

Table 3-10 Current Sequence Component Parameter Mapping

HMI Label	Parameter
I0 MAG	User Channel 1-12 Current Zero-Sequence Magnitude
I1 MAG	User Channel 1-12 Current Positive-Sequence Magnitude
I2 MAG	User Channel 1-12 Current Negative-Sequence Magnitude
I0 ANG	User Channel 1-12 Current Zero-Sequence Angle
I1 ANG	User Channel 1-12 Current Positive-Sequence Angle
I2 ANG	User Channel 1-12 Current Negative-Sequence Angle
I UNBL	User Channel 1-12 Current Unbalance Factor

3.2.6 Max/Min Display and Operations

To enter the **Max/Min** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **Max/Min** option and press **OK.**

Continue to select the **A/B/C & System** option and press **OK.**

Use the **Left** or **Right** keys to query the **Max/Min** parameters. There are fifteen pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

Table 3-11 Maximum / Minimum Parameter Mapping

HMI Label	Parameter
Freq	System Max / Min Frequency
Van	Phase A Max / Min Line-to-Neutral Voltage
Vbn	Phase B Max / Min Line-to-Neutral Voltage
Vcn	Phase C Max / Min Line-to-Neutral Voltage
Vab	Phase AB Max / Min Line-to-Line Voltage
Vbc	Phase BC Max / Min Line-to-Line Voltage
Vca	Phase CA Max / Min Line-to-Line Voltage
V unb	Max / Min Voltage Unbalance Factor Magnitude
I	Phase A/B/C Max / Min Current
P	Phase A/B/C Max / Min Active Power
Q	Phase A/B/C Max / Min Reactive Power
S	Phase A/B/C Max / Min Apparent Power
FP	Phase A/B/C Max / Min Power Factor
Vthd	Phase A/B/C Max / Min Voltage THD
I C1 - C24	Input Channel 1 - 24 Max / Min Current
P C1 - C24	Input Channel 1 - 24 Max / Min Active Power
Q C1 - C24	Input Channel 1 - 24 Max / Min Reactive Power
S C1 - C24	Input Channel 1 - 24 Max / Min Apparent Power
PF C1 - C24	Input Channel 1 - 24 Max / Min Power Factor
Ithd C1 - C24	Input Channel 1 - 24 Max / Min Current THD
I U1 - U12	User Channel 1 - 12 Max / Min Current
P U1 - U12	User Channel 1 - 12 Max / Min Active Power
Q U1 - U12	User Channel 1 - 12 Max / Min Reactive Power
S U1 - U12	User Channel 1 - 12 Max / Min Apparent Power
PF U1 - U12	User Channel 1 - 12 Max / Min Power Factor

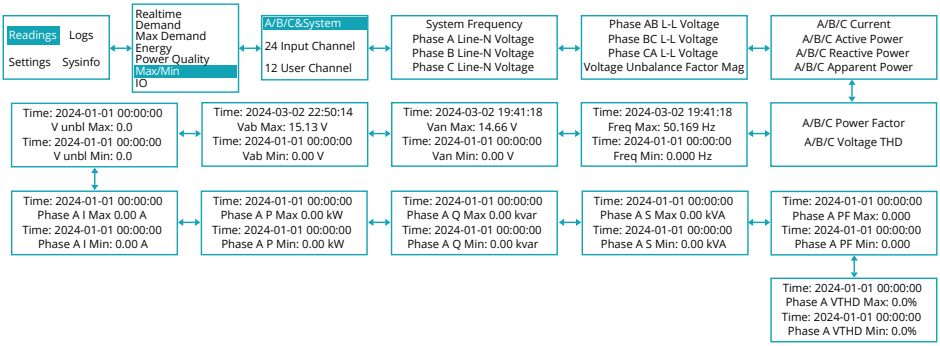


Figure 3-8 Max / Min Screen Sequence

3.2.7 I/O Display and Operations

To enter the **IO** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Readings** option, and press **OK** to enter the next-level submenu.

Navigate to the **I/O** option and press **OK.**

Use the **Left** or **Right** keys to query the **I/O** parameters. There are three pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.

Table 3-12 Digital Input and Output Parameter Mapping

HMI Label	Parameter
DI1 Status	Digital Input 1 Status
DI1 Pulse	Digital Input 1 Pulse Constant
DI2 Status	Digital Input 2 Status
DI2 Pulse	Digital Input 2 Pulse Constant
DI3 Status	Digital Input 3 Status
DI3 Pulse	Digital Input 3 Pulse Constant
DI4 Status	Digital Input 4 Status
DI4 Pulse	Digital Input 4 Pulse Constant
DO1 - DO8 Status	Digital Output 1-8 Status
RO1	Relay Output 1 Status
RO2	Relay Output 2 Status

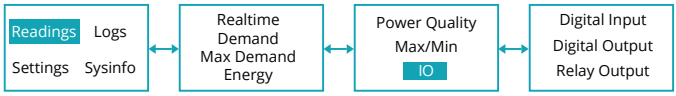


Figure 3-9 I/O Screen Sequence

3.3 Logs Menu

3.3.1 PQ Event Log Display and Operations

To enter the **PQ Event Log** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Logs** option, and press **OK** to enter the next-level submenu.

Navigate to the **PQ Event Log** option and press **OK.**

Use the **Left** or **Right** keys to query the **PQ Event** Log parameters. There are two pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.



Figure 3-10 PQ Event Log Screen Sequence

3.3.2 Alarm Log Display and Operations

To enter the Alarm Log screen from the main menu, use the Left, Right, Up, and Down arrow keys to select the Logs option, and press OK to enter the next-level submenu.

Navigate to the Alarm Log option and press OK.

Use the Left or Right keys to query the Alarm Log parameters. There are two pages of parameters. The user can navigate between pages using the Up and Down keys.

Press the Left and Right keys at the same time to exit the menu.



Figure 3-11 Alarm Log Screen Sequence

3.3.3 SOE Log Display and Operations

To enter the **SOE Log** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Logs** option, and press **OK** to enter the next-level submenu.

Navigate to the SOE Log option and press **OK.**

Use the **Left** or **Right** keys to query the **SOE Log** parameters. There are two pages of parameters. The user can navigate between pages using the **Up** and **Down** keys.

Press the **Left** and **Right** keys at the same time to exit the menu.



Figure 3-12 SOE Log Screen Sequence

3.4 Settings Menu

3.4.1 Basic Display and Operations

To enter the **Basic** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Navigate to the **Basic** option and press **OK.**

Continue to select the parameter and press **OK.**

Press the **Left** and **Right** keys at the same time to exit the menu.

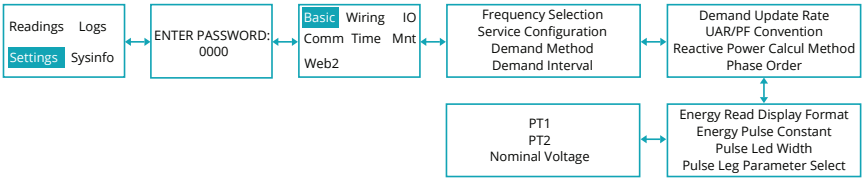


Figure 3-13 Basic Settings Log Screen Sequence

3.4.2 Wiring Display and Operations

To enter the **Wiring** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3,

Section 3.1 for details on how to input the password.

Navigate to the **Wiring** option and press **OK.**

Select the parameter to be set, then press **OK.** Ensure correct configuration according to the CT ratio, current channels, and sampling voltage.

Press the **Left** and **Right** keys at the same time to exit the menu.

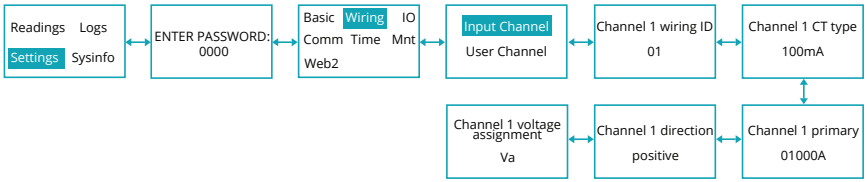


Figure 3-14 Wiring Screen Sequence

INFO Depending on the model, the meter is compatible with 80mA, 100mA or 333mV, and Rogowski Coil Current Transformers (RCTs).

3.4.3 I/O Display and Operations

To enter the **I/O** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Navigate to the **I/O** option and press **OK.** The I/O menu provides configuration settings for Digital Outputs (DO), Digital Inputs (DI), and Relay Outputs (RO).

3.4.3.1 Digital Output Settings

Select the **DO Settings** and press **OK.**

Use the **Left** and **Right** keys to move between the different digital output channels, DO1-DO8, then press **OK** to select.

Each digital output channel has three configuration options:

- Type
  The digital output type can be configured as:
  - Energy Pulse Output
  - Alarm Indication

- Pulse Width
- Parameter

Use the **Left** or **Right** keys to select the desired option.

Use the **Left** and **Right** keys to select **Pulse Width** or **Parameter.** Press the **Up** and **Down** buttons to set up the parameters.

3.4.3.2 Digital Input Settings

For the **DI Settings,** use the **Left** and **Right** keys to move between different digital input channels, DI1-DI4.

Each digital input has two configuration options:

- Type
- Pulse Constant

The digital input type can be configured as:

- Status Monitor
- Pulse Counter

Use the **Left** or **Right** keys to select the desired option and the **Up** or **Down** keys to set up the parameters.

3.4.3.3 Relay Output Settings

For the **RO Settings,** use the **Left** and **Right** keys to move between different relay outputs,RO1-RO2.

Each relay output has three configuration options:

- Type
  The relay output type can be configured as:
  - Relay
  - Alarm
- Control Mode
  The control mode can be configured as:
  - Latch
  - Momentary
- Pulse Width

Use the **Left** or **Right** keys to select the desired option.

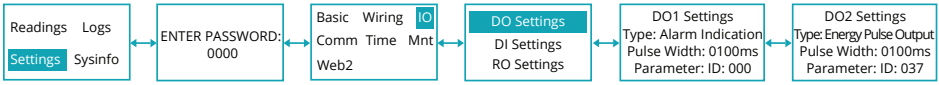


Figure 3-15 D/O Screen Sequence

3.4.4 Serial Port Display and Operations

To enter the **Serial Port** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Select the **Comm** option and press **OK** to enter the next-level submenu. Select the **Serial Port Baud Rate & Parity** option and press **OK.**

Use the **Up** and **Down** keys to select the desired option and press **OK** to confirm.

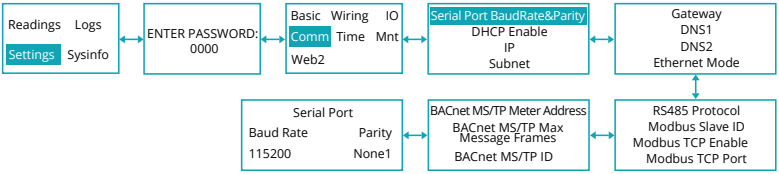


Figure 3-16 Serial Port Screen Sequence

3.4.5 Time Display and Operations

To enter the **Time** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Continue to select the **Time** option and press **OK.**

Use the **Up** and **Down** keys to configure the desired **Date & Time** and press **OK** to confirm.

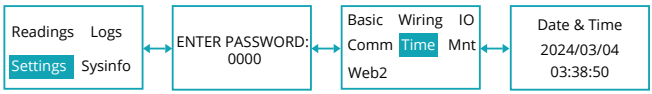


Figure 3-17 Time Screen Sequence

3.4.6 Management Display and Operations

To enter the **Management** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press OK to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Continue to select the **Mnt** option and press **OK.**

Use the **Up** and **Down** keys and **OK** to select the required data for deletion. For **Max Demand,** users can choose the deletion method: **Manual, Automatic, or Disable.** The automatic deletion mode can be set with a time limit, and the deletion time can be queried.

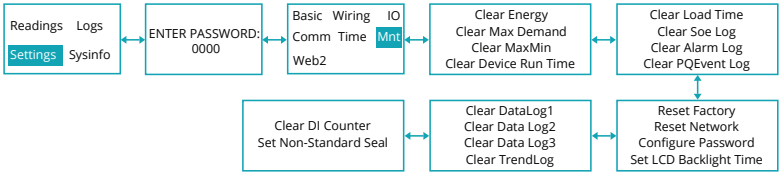


Figure 3-18 Management Screen Sequence

3.4.7 WEB2 Display and Operations

To enter the **WEB2** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **Settings** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Select the **Web2** option and press **OK.**

Use the **Up** and **Down** keys to select the desired option and press **OK** to confirm.

If applicable, the **WEB2** menu provides configuration options for Ethernet and Wi-Fi communication parameters. Users can **Enable** or **Disable** DHCP for Ethernet ports and configure network parameters including the **IP address, Subnet Mask, Gateway,** and **DNS settings.**

When DHCP is enabled, the IP address is assigned automatically by the network. When DHCP is disabled, IP parameters must be entered manually.

For models supporting dual Ethernet ports, independent network settings are available for **Eth1** and **Eth2.** For models equipped with Wi-Fi, the **Wi-Fi IP** and related settings can also be viewed and configured in this menu.

The **WEB2** menu also includes system-level control functions such as **System Mode, Clock Sync Enable, Reboot Device,** and **Reset Network.**

The **Reboot Device** option restarts the Web2 module, while **Reset Network** restores network parameters to default settings.

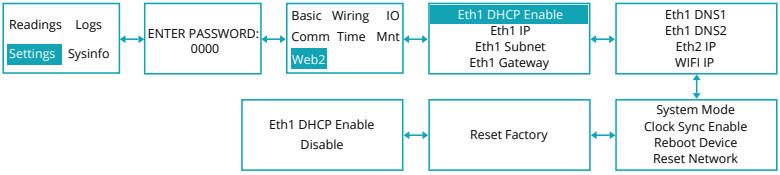


Figure 3-19 WEB2 Screen Sequence

3.5 SysInfo Menu

3.5.1 MAC Address and Operations

To enter the **MAC Address** screen from the main menu, use the **Left, Right, Up,** and **Down** arrow keys to select the **SysInfo** option, and press **OK** to see the password prompt.

Input the correct password and press **OK** to enter the next-level submenu. Refer to Chapter 3, Section 3.1 for details on how to input the password.

Continue to select the **MAC Address** option and press **OK.**



Figure 3-20 SysInfo Screen Sequence

Chapter 4: Functions and Software

4.1 Introduction to the Acuview 2 Software

The AcuRev 4100 offers a wide range of measurement parameters along with power quality detection, alarm, and other functions. The Acuview 2 software is a customized software that can be used to configure and read data from the AcuRev 4100 meter. This chapter explains the functions of the meter in combination with the Acuview 2 software, which provides a user-friendly interface for configuration, monitoring, and data analysis.

The **Acuview 2 Software** can be downloaded free of charge from the Mod-Tronic website.

4.1.1 Connecting the AcuRev 4100 to Acuview 2

Users can connect to the software either via the RS485 port or by Ethernet/Wi-Fi.

RS485 Connection

To connect via RS485, an **RS485-to-USB converter** is required. The converter allows the RS485 port of AcuRev 4100 to be linked directly to a computer USB port.

Ethernet / Wi-Fi Connection

AcuRev 4100 can also be connected over a local network using either Ethernet or Wi-Fi, providing convenient access for configuration and monitoring.

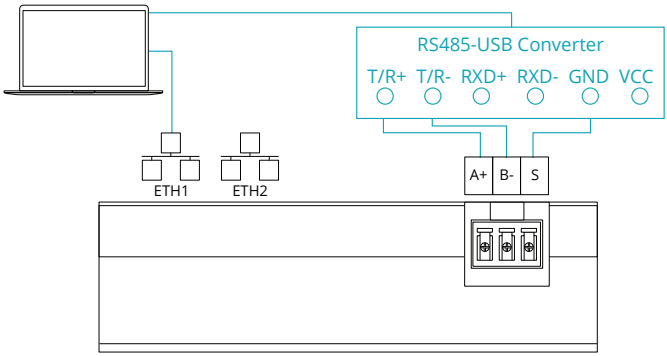


Figure 4-1 AcuRev 4100 Communication Port Connections

Three wires should be used in connecting the USB-RS485 converter to the meter. T/R+ to A+, T/R- to B-, and GND from the converter to S on the meter.

Steps to Connect to the Software:

1. **Open the Acuview 2 software.**
   When connecting for the first time, click the + symbol to the right of the **Click To Add New Meter** button.



Figure 4-2 Add AcuRev 4100 to Acuview 2

2. **Configure AcuRev 4100**
   On the new page, click ⊕ to set a name for the electricity meter, and select **AcuRev 4100** as the model.

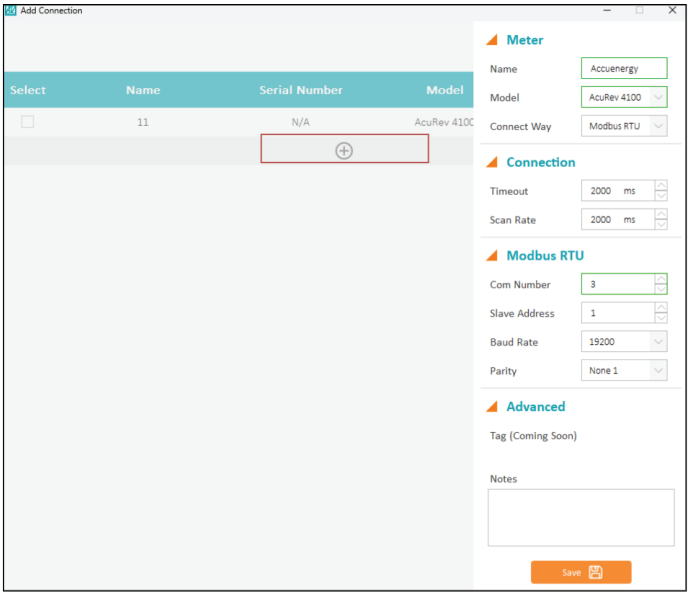


Figure 4-3 Configuring AcuRev 4100 in Acuview 2 Page

3. **Select Communication Method**

There are two connection methods, **Modbus RTU** or **Modbus TCP.**

If **Modbus RTU** is selected, configure the device using the default parameters below.

Table 4-1 Modbus RTU Default Values

Parameters	Default Values
Slave Address	1
Baud Rate	19,200
Parity	None1 (No parity, 1 stop bit)

The COM port can be confirmed in the Device Manager on the user's computer. Click **Save** to save the configuration.

If **Modbus TCP** is selected, configure it according to the corresponding default settings.

Table 4-2 Mobus TCP Default Values

Parameters	Default Values
IP Address	192.168.001.254
Slave Address	1
Port Number	502

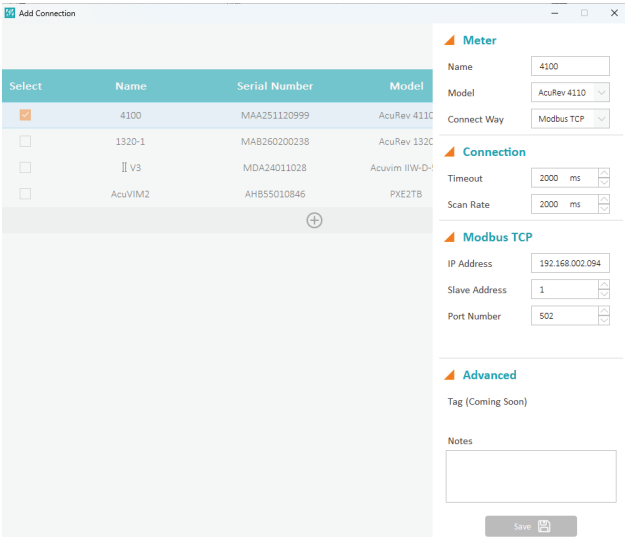


Figure 4-4 Modbus TCP Configuration

After completing the configuration, click **SAVE.**

4. **Setup Connection**

   Select the devices that need to be connected, then click **Connect.**

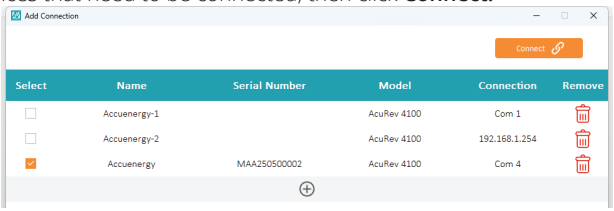


Figure 4-5 Select Connected Devices

5. **Verify The Connection**

   After the connection is successful, users will enter the main interface.

4.1.2 Main Interface

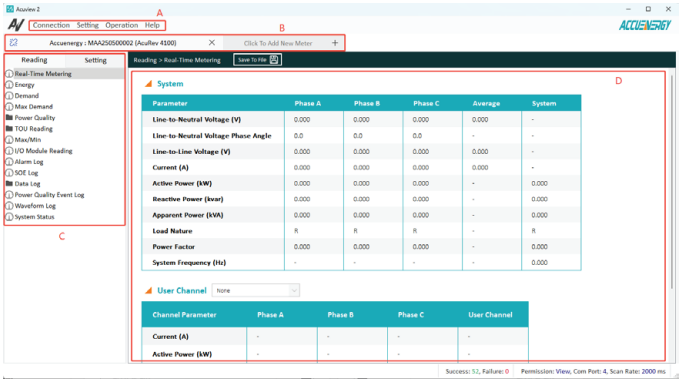


Figure 4-6 Acuview 2 Main Interface

A. Menu Bar

Connection Menu

Table 4-3 Connection Menu Information

Icon	Function	Description
	Connect	Connect the device, enable data reading, and allow write commands.
	Disconnect	Disconnect the device, stop data reading, and disallow write commands.
	Add Connection	Add and connect to a new device.
	Remove Connection	Disconnect and remove the currently active connection.

Setting Menu

Table 4-4 Setting Menu Information

Icon	Function	Description
	General Setting	Check and set the general settings of the Acuview 2.
	Data Log Setting	Check and set the data log settings of each connected meter.
	Clear Cache	Clear the cache of Acuview 2.

Operation Menu

Table 4-5 Operation Menu Parameters

Icon	Function	Description
	Export Configuration	Save the currently active meter's configuration and export it as a configuration file.
	Import Configuration	Select a downloaded configuration file and import the settings to the current meter.
	Firmware Update	Select a firmware file and update available meters.
	Find Device	Search for all available meters on the local network.
	Calculate Pulse Constant	Calculate pulse constant parameters.
	Start Data Logging	Start data logging if the data log settings are completed.
	Stop Data Logging	Stop data logging.

Help Menu

Table 4-6 Help Menu Parameters

Icon	Function	Description
	User Manual	Open the Acuview 2 user manual.
	About	Open a window that displays software information.
	Check for Software Update	Check for software updates.

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B. Window Title

Displays the name, serial number, and model type for each device. Users can choose the device to interact with by clicking the corresponding tab.

C. Explore Panel

Allows for quick navigation of the AcuRev 4100 functions. The basic functions of the device are divided into two parts, **Reading** and **Setting.** Data in the **Reading** section will automatically refresh according to the configured **Scan Rate** when the user initially connects the AcuRev 4100.

D. Data Panel

Presents real-time readings of the meter and provides users with various operations to interact with and control the meter's functionality. The top function bar displays the current page name along with additional operation buttons, such as **Save** and **Reset.**

4.2 Settings

Users can configure the settings of the AcuRev 4100 from the Acuview 2 software. Some of the settings include the password, communication, and demand method.

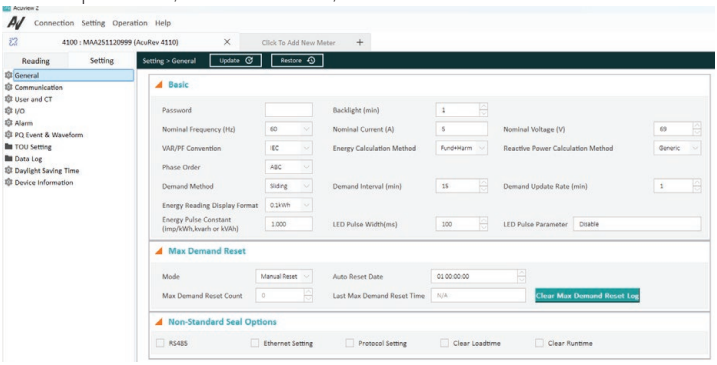


Figure 4-7 Configure AcuRev 4100 Settings via Acuview 2

4.2.1 General

To access the **General Settings** from Acuview 2, click on the **Settings** tab located in the explore panel of the software and select **General.** Users can change the settings for the AcuRev 4100 and use the **Update** button at the top of the page to confirm the settings.

4.2.1.1 Basic Settings

Password: The default password is 0000. Users can change the meter password using this setting. The range is 0000-9999.

Backlight (min): Users can set the backlight duration. The range is 0-120 minutes.

Nominal Frequency (Hz): The default nominal frequency is 60 Hz. Users can change the frequency to 50 Hz.

Nominal Current (A): The nominal current range is 1 – 50,000 A, depending on the connect current transformer (CT) ratio and default value is 1000 A.

PT1 (V): The range is 50 – 1,00,0000 V and the default value is 480 V. PT1 must be greater than or equal to the PT2 and nominal voltage with a minimum value of 50 V. This is a sealed parameter.

PT2 (V): The range is 50 – 830 V and the default value is 480 V. All voltage-related calculations, including power, energy, alarms, data log, and waveform use the PT1/PT2 ratio. Verify that the values reflect the primary ratio measurements. This is a sealed parameter.

Nominal Voltage (V): Range is from 50 to the set PT1 (V) value and default value is 480V.

VAR/PF Convention: Users can change the convention to IEC or IEEE.

Energy Calculation Method: Select the method to calculate energy consumption using fundamental + harmonic (Fund+Harm) full wave energy calculation.

In Fund+Harm calculation, AcuRev 4100 calculates energy using both the fundamental component and harmonic components of the measured waveform. This provides full-wave energy calculation instead of calculating energy from the fundamental component only.

Reactive Power Calculation Method: This method can be configured as either True or Generic.

- **True:** Uses the Budeanu's concept to calculate the true reactive power. This method generally takes the harmonic components to do the calculation instead of using the power vector triangle method.
- **Generic:** Uses Fryze's concept to calculate the generalized reactive power. This method separates instantaneous current into two components, active and reactive currents.

Demand Method: There are two types of demand that the user can select, Fixed Window and Sliding Window. The default method is Sliding Window.

- **Fixed Window:** The demand is calculated based on a selected calculation period between 1 and 30 minutes. AcuRev 4100 calculates and updates the demand values at the end of each calculation period.
- **Sliding Window:** The demand is calculated by selecting the calculation period between 1 and 30 minutes. AcuRev 4100 averages the energy accumulated within this period, and the demand value is updated every minute.

Demand Interval & Demand Update Rate: Users can set the duration between 1 and 30 minutes.

Energy Reading Display Format: The Energy Reading Display option includes 0.1 Mode, 0.01 Mode, and 0.001 Mode which corresponds to the Energy Display Mode in the system parameter settings. The default energy display mode is 0.1 Mode.

Energy Pulse Output Function:

- Users can select specific energy parameters within the system as the source for pulse output. The pulse width is configured to convert energy usage to pulse.
- Default pulse width is 100 ms with an adjustable range of 20 – 3000 ms.
- Based on real-time energy usage, the device generates output pulses. The pulses can then be supplied to external equipment for secondary metering.
- All outputs of AcuRev 4100 such as DO and LED outputs, use the same pulse constant. For settings, read the Chapter 4, Section 4.2.1 General Settings->Basic->Energy Pulse Constant.

Available Units: Imp/kWh, Imp/kvarh or Imp/kVAh

User Conversion Formula: Measured Value = Pulse Count / Pulse Constant (kWh)

Clear Max Demand Reset Log: Clears the max demand reset count and last max demand reset time.

4.2.1.2 Max Demand Reset

In Max Demand Reset, there are three options available: Manual, Auto and Disable.

If **Auto** is selected, the maximum demand can automatically be cleared at the preset time points. The sequence of time setting is day-hour-min-sec. The number of record clearings and the corresponding times can be recorded.

4.2.1.3 Non-Standard Seal Options

Users can seal the following four functions with lead seals. Once selected and updated, the parameters cannot be modified when the physical seal is in place.

1. RS485
2. Ethernet Settings
3. Protocol Settings
4. Clear Load Time/Run Time

The **Standard Seal** function cannot be modified. When sealed, the following standard functions cannot be changed.

1. Wiring Configuration
2. Energy Pulse Output Configuration
3. Demand Configuration
4. PF/VAR Calculation Method
5. Energy Calculation Method
6. TOU Configuration and TOU Records
7. Nominal Voltage, Nominal Current, PT1, and PT2
8. Non-Standard Sealing Function Configuration

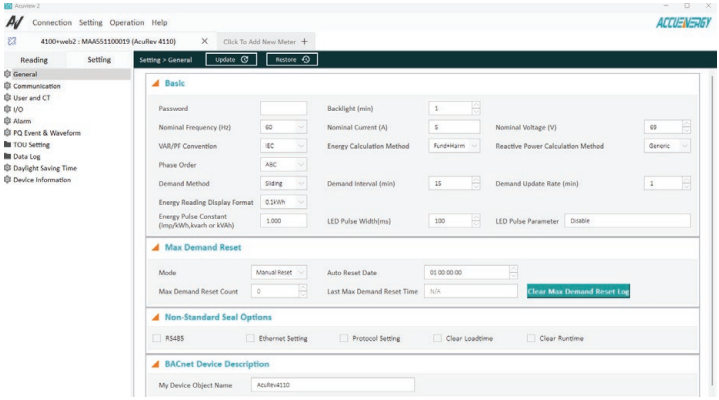


Figure 4-8 General Settings

After modifying the parameters, click **Update** to save the new settings to the meter.

To cancel the changes and revert to the previously saved values, click **Restore.**

The same procedure applies to all configuration pages.

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4.2.2 Communication

The Ethernet default communication settings on the AcuRev 4100 are:

Table 4-7 Ethernet Default Values

Parameters	Default Values
IP Address	192.168.1.254
Subnet Mask	255.255.255.0
Gateway	192.168.1.1

Address: Users can configure the Modbus Slave ID for the meter. The default is 1, and the range is 1-247.

Ethernet Mode: AcuRev 4100 provides multiple Ethernet operation modes to support different network topologies and installation requirements. Users can select the appropriate Ethernet mode from the Ethernet Mode dropdown menu. The following Ethernet modes are available:

- **RSTP Enabled:** In this mode, both Ethernet ports are enabled and operate with Rapid Spanning Tree Protocol (RSTP) support. This mode is intended for ring or redundant network topologies, allowing the device to participate in an RSTP-enabled Ethernet network. RSTP provides fast convergence and loop prevention, ensuring reliable communication in redundant network architectures.
- **Dual ETH (No RSTP):** In this mode, both Ethernet ports are enabled, but RSTP is disabled. The two Ethernet ports function as independent or pass-through connections without loop detection or redundancy control.
- **Single ETH (No RSTP):** In this mode, only a single Ethernet port is active, and RSTP is disabled. The meter operates as a standard single-port Ethernet device.

The RS485 default communication settings on the AcuRev 4100 are:

Table 4-8 Default RS485 Values

Parameters	Default Values
Slave Address	1
Baud Rate	19,200
Parity	None1 (No parity, 1 stop bit)

Address: Users can configure the Modbus address for the device. This refers to the Modbus address via RS485. The range is from 1-247, and the default address is 1.

Baud Rate: Users can configure the baud rate for the RS485 port. The range is 2400-115200 bps. The default is 19200.

Parity: Users can configure the parity for which the default is None1 (No parity, 1 stop bit).

Additionally, the product supports the BACnet MS/TP protocol via the RS485 serial interface. This protocol only allows reading of electrical parameters and does not support configuration or setting changes. The default settings are:

Table 4-9 Default MS/TP Values

Parameters	Default Values
MS/TP Meter Address	1
MS/TP Max Msg Frames	255
MS/TP ID	1

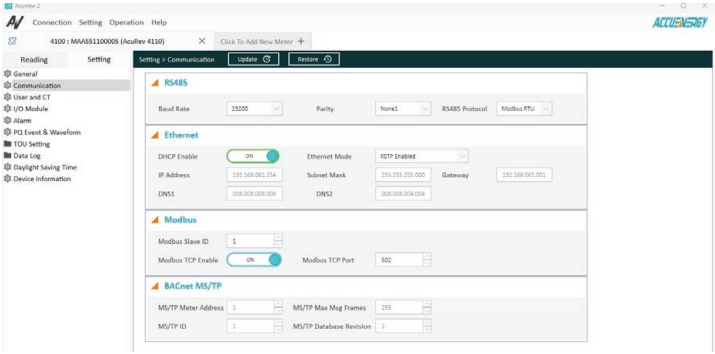


Figure 4-9 Communication Settings

4.2.3 User and CT

Users can set the wiring mode, input channel, and user channel.

Wiring Type

There are five wiring methods which be selected based on the electricity demand.

1. 1 Element 2 Wire
2. 2 Element 3 Wire 1 Phase
3. 3 Element 4 Wire Wye
4. 2 Element 3 Wire Network
5. 2 Element 3 Wire Delta

INFO

It is strongly recommended to select the wiring method during the initial setup of the device. Changing the wiring method while the meter is in operation may cause complications. After modifying the wiring method, all related data—including user group configurations, electrical parameters, maximum demand, and power quality data—must be cleared. Energy resetting is optional, depending on user preference. Failure to do so may result in data mismatches.

Current Input Channel

The AcuRev 4100 provides 24 current input channels, each of which can be configured independently.

Input Wiring:

- By default, each logical channel ID corresponds to its physical wiring input.
- If a miswiring occurs, users can simply reassign the correct wiring to the corresponding logical channel.
- This flexibility eliminates the need for physical rewiring, allowing corrections to be made directly in the software.

CT Type:

1. mA: 100 mA or 80 mA
2. mV: 333 mV or Rogowski Coil Current Transformer

The default current transformer primary is 1000A. Users can set up values between 1 – 50,000 A. The default current direction is positive, and it can be changed to negative if a CT is reversed.

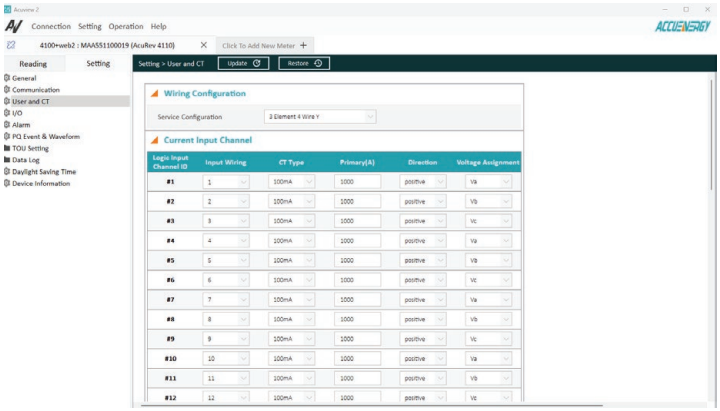


Figure 4-10 User and CT Settings

Voltage Channel Assignment:

For each current input channel, users can assign the corresponding voltage reference as A, B, C, AB, BC, or CA. This provides flexibility in aligning the voltage configuration with the selected wiring scheme.

User and Channel Mapping

AcuRev 4100 supports 12 user channels for circuit mapping.

Each of the 12 user channels can be assigned a custom name of up to 20 ASCII characters in the description field. By default, channels are named **User Channel 1** through **User Channel 12,** and the description field is empty. When a description is entered, the software displays the channel as **User Channel N: Description,** where **N** represents the channel number. Descriptions are not protected by the lead seal and are retained when the wiring type is changed. It is also not required for 1E2W wiring.

- User Channel Mapping is automatically preset according to the selected wiring method. Only minimal adjustments are required if changes are needed.
- Each channel can be customized to meet specific application requirements.

> **INFO** Each wiring method corresponds to a specific default user group. For details, refer to Chapter 2, Section 2.3 Wiring Configuration.

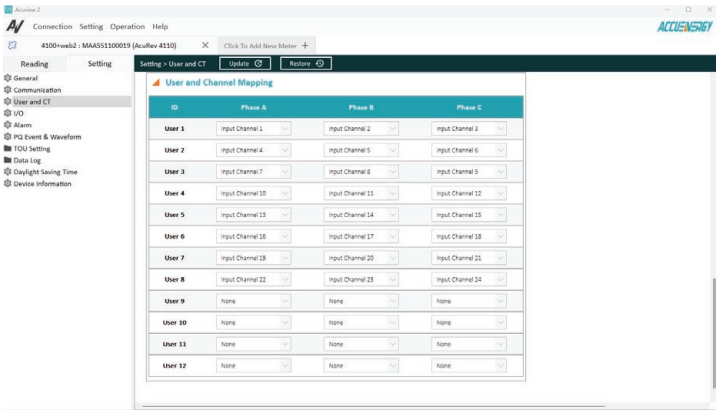


Figure 4 -11 User and Channel Mapping

4.2.4 I/O Module

There are 8 digital output ports, 4 digital input ports, and 2 relay output ports.

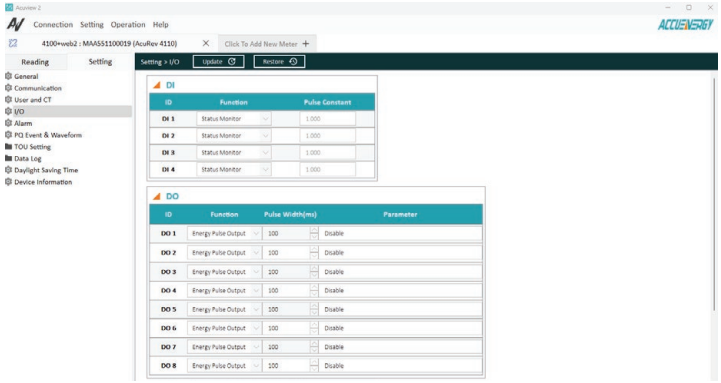


Figure 4-12 DI Module Settings

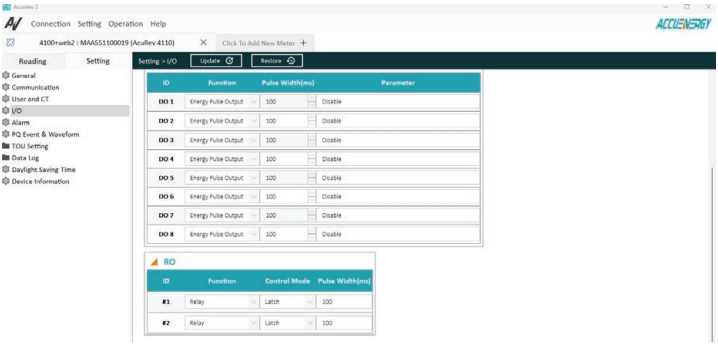


Figure 4-13 DO and RO Module Settings

Digital Output (DO):

There are two types of digital output, **Energy Pulse Output** and **Alarm Indication.** The default pulse is 100 ms, and the range is 20 – 3000 ms.

- Type: Photo-MOS
- Voltage Range: 0 – 30 VAC
- Maximum Load Current: 100 mA (max)
- Output Frequency: 25 Hz, 50 % duty cycle (20 ms ON, 20 ms OFF)
- Isolation Voltage: 2500 VAC

Energy Pulse Output Function

- Users can select specific energy parameters within the system as the source for pulse output. The pulse width is configured to convert energy usage to pulse.
- Default Pulse Width: 100 ms; Adjustable range: 20–3000 ms.
- Based on real-time energy usage, the device generates output pulses. These pulses can then be supplied to external equipment for secondary metering.
- All outputs of this device (DO, LED) use the same pulse constant. For settings, see section 4.2.1 General Settings->Basic->Energy Pulse Constant.

Units: imp/kWh, imp/kvarh or imp/kVAh

User Conversion Formula: Measured value = Pulse Count / Pulse Constant (kWh)

Alarm Indication Function

- The digital output can also be configured to indicate alarm conditions.
- Output is activated when a user-defined alarm event occurs, as configured in an alarm menu.
- Output is automatically cleared when the alarm condition is resolved.

Digital Input (DI):

Each DI can be configured for one of the following two functions: **Pulse Counter** and **Status Monitor.**

Pulse Counter Function

- Used for pulse metering, recording both the raw pulse count and the corresponding converted physical measurement.
- A pulse constant must be configured as the reference for conversion.
- The relationship is defined as:
  For Pulse Constant
  Unit: kWh/imp
  Physical Measurement = Pulse Count × Pulse Constant.
  For Pulse Constant
  Unit: imp/ kWh
  Physical Measurement = Pulse Count / Pulse Constant.

Status Monitor Function

- Monitors the status signals of external inputs and records any changes.

- When the status changes, the device records an SOE (Sequence of Events) entry with both the status and timestamp.
- If the DI is also configured as an input parameter in the Alarm function, alarm events will be triggered according to the specified alarm logic.
- If not linked to the Alarm function, only SOE records are stored without triggering alarms.

Table 4-10 Digital Input Specifications

Type	Dry Connection
External Power Supply Voltage Range	20 – 30 VAC
Maximum Pulse Frequency	50 Hz, 50 % duty cycle (10 ms ON and 10 ms OFF)
On-State Voltage	15 V
Off-State Voltage	5 VDC
Isolation Voltage	2500 VAC

Relay Output (RO):

Each Relay Output (RO) can be configured for one of the following two functions: **Relay Control** or **Alarm Indication.**

- **Relay Control**
  The relay output is controlled directly by user commands through communication protocols, enabling automation control. Following are the relay control modes:
  - **Latch Mode:**
    - User commands set the relay to ON or OFF. For example, if the user sends an ON command, the relay switches ON and remains ON until an OFF command is received.
    - The Pulse Width parameter is not applicable in this mode.
  - Momentary Mode:
    - The relay is activated temporarily for a defined pulse width. For example, if the user sends a command to turn ON the relay, it remains ON for the set pulse width duration, then automatically returns to OFF.
    - If the user sends a command to turn OFF the relay, no action is performed.
- **Alarm Indicator**
  The relay output can also be configured as an alarm indicator, responding to alarm events defined in the Alarm settings. The following are the control modes for alarm indicator:
  - **Latch Mode:**
    - The relay state follows the alarm status. For example, if the alarm status is ON, the relay switches ON and remains ON; if the alarm status is OFF, the relay switches OFF and remains OFF.
    - The Pulse Width parameter is not applicable in this mode.

- **Manual Mode:**
  - When an alarm occurs (Status = ON), the relay switches ON and remains ON even after the alarm clears.
  - The relay output can only be reset manually by the user, for example, from the host computer or control interface.
  - The Pulse Width parameter is not applicable in this mode.

Table 4-11 Relay Output Specifications

Type	1A
Switching Voltage (Maximum)	250 VAC, 30 VDC
Load Current	5 A (Resistive), 3 A (Inductive)
Set Time	10 ms (Maximum)
Contact Resistance	100 mΩ (Maximum)
Isolation Voltage	2500 VAC

4.2.5 Alarm

Alarm Parameters are organized in secondary and third level menu, selectable through the block filter.

Table 4-12 Alarm Menus

Main Menu	Secondary Menu	Third Level Menu
Readings	Real-Time	System Real-Time
		Input Channel Real-Time
		User Channel Real-Time
	Demand	System Demand
		Input Channel Demand
		User Channel Demand
	THD	System THD
		Input Channel THD
	Sequence and Unbalance	System Sequence
		System Unbalance
		User Channel Sequence
		User Channel Unbalance
	Harmonics	System Harmonics
		Input Channel Harmonics
	DI	DI Status

By double-clicking the **Parameter** field, a parameter selection window will appear.

Users can choose the desired parameter from a drop-down list, or search using keywords in the search bar at the top.

As the user types, the system automatically suggests relevant parameters in the panel on the right.

Select the required parameter and click **Apply** to confirm the selection.

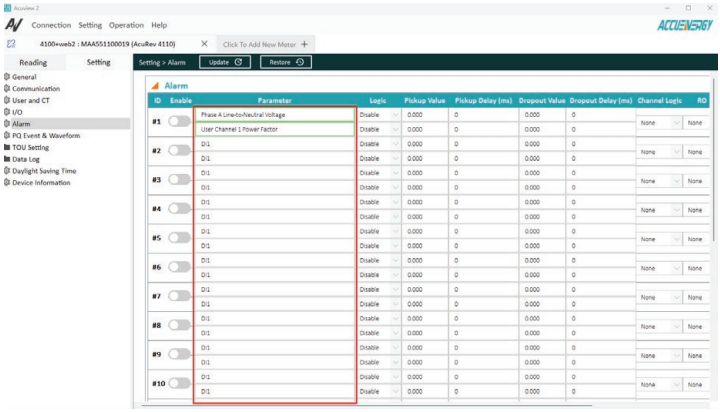


Figure 4-14 Alarm Settings

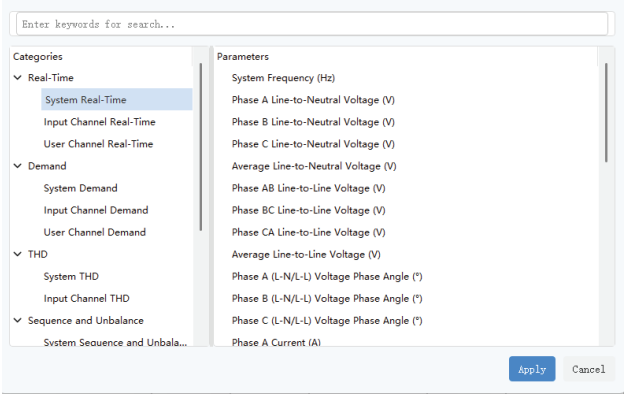


Figure 4-15 Alarm Parameters

Each alarm parameter supports **pickup** and **dropout** settings.

- **Pickup Value:** The threshold at which the alarm is activated.

- **Pickup Delay:** The time for which the condition must last before the alarm is triggered.
- **Dropout Value:** The threshold at which the alarm is cleared.
- **Dropout Delay:** The time for which the condition must last before the alarm is cleared.

The **Channel Logic** setting defines the output logic between parameters **P1** and **P2.**

- **AND:** An alarm is triggered only when **both P1 and P2** meet their pickup conditions. The alarm is released when **either P1 or P2** meets its dropout condition.
- **OR:** An alarm is triggered when **either P1 or P2** meets its pickup condition. The alarm is released only when **both P1 and P2** meet their dropout conditions.

For each alarm monitor, the user can select **1 RO** and **1 DO** for alarm indication.

Example:

Logical "AND" for Alarm Monitor 1 Configuration

Parameter 1

- Va
- Logic ">"
- Starting Voltage: 150 V
- Starting Delay: 500 ms
- Release Voltage: 120 V
- Release Delay: 200 ms

Parameter 2

- Ia
- Logic "<"
- Starting Value: 5 A
- Starting Delay: 400 ms
- Release Value: 20 A
- Release Delay: 300 ms
- DO Selection: DO1
- RO Selection: RO2

When Va ≥ 150V and lasts for 500ms; and Ia ≤ 5A and lasts for 400ms, Alarm Monitor 1 is activated i.e. ON. Then, DO1 and RO2 outputs are triggered.

When Va ≤ 120V and lasts for 200ms; or Ia ≥ 20A and lasts for 300ms, Alarm Monitor 1 is deactivated i.e. OFF. Then, DO1 and RO2 outputs are triggered again, to return to regular condition.

INFO If DI, DO, or RO options are not available in the Alarm settings, please check the I/O configuration module to verify whether DI is configured as status alarm, DO as alarm output, and RO as alarm output.

4.2.6 PQ Event & Waveform

The AcuRev 4100 provides flexible, user-configurable Power Quality (PQ) events along with a comprehensive waveform recording function.

4.2.6.1 Waveform Recording

Waveform recording supports three trigger modes.

1. Manual Trigger
   - Selected User (one of 12/24 available): Records all current channels under the selected user, plus the three-phase voltages A, B, C.
   - Voltage Only records the three-phase voltages A, B, C.

2. DI Trigger
   - Each of the four Digital Inputs (DIs) can be assigned to a different user.
   - When the DI is activated, all channel currents and three-phase voltages for the corresponding user are recorded automatically.

3. PQ Event Trigger
   - When enabled, waveform recording is linked to PQ events.
     - Voltage-Type Events: Records only the three-phase voltages.
     - Current-Type Events: Records all channel currents for the user and three-phase voltages where the event occurs.

Recording Capacity and Settings:

- Configurable waveform sample rate and pre-/post-trigger cycle count.
- Up to 2,560 samples can be captured before and after the trigger.
- Stores a maximum of 200 waveform records. When the log capacity reaches 200 entries, the oldest log is automatically overwritten by the new entry.

4.2.6.2 Power Quality (PQ) Events

The following power quality event types are supported:

- Voltage Sag
- Voltage Swell
- Voltage Interruption
- Current Swell

Configuration parameters are as follows:

- Enable Switch: Enables or disables PQ event detection.
- Threshold & Hysteresis: Defines actuation and release thresholds. For Voltage Sag and Voltage Interruption the following limitation applies **Voltage Sag Threshold> Voltage Interruption Threshold + 10%.**
- Triggering Waveform:
  - ON – Event detection triggers waveform recording.
  - OFF – Event will generate a record, but it will not trigger a waveform.
- DO: Select a DO that will be triggered when a PQ event occurs.
- RO: Select an RO that will be triggered when a PQ event occurs.

When a PQ event occurs, an event log is automatically saved in flash memory. Up to 200 PQ event logs can be stored.

When the log capacity reaches maximum entries, the oldest log is automatically overwritten by the new entry.

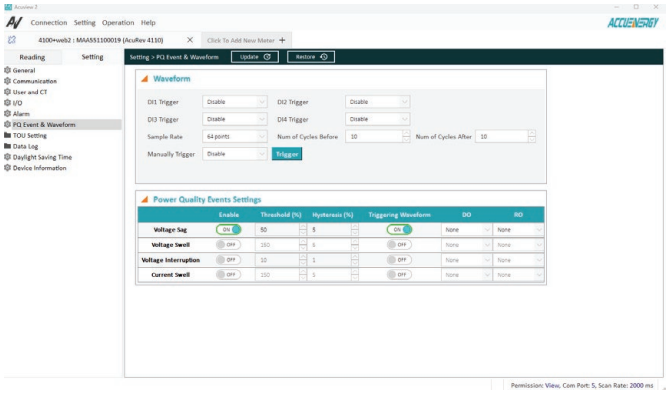


Figure 4-16 Waveform Settings

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4.2.7 TOU Setting

Monthly Billing Mode: There are two types of monthly billing modes, End of month and Assigned Date.

End of Month: AcuRev 4100 automatically performs billing on the last day of each month.

Assigned Date: Allows users to define a specific day and time for monthly billing. The time format is specified as DD HH:MM:SS.

Tariff: AcuRev 4100 supports up to 4 tariffs in the TOU function. The range is 1- 4, where 1 means 1 tariff and 4 means all 4 tariffs are used.

1. Sharp
2. Sharp, Peak
3. Sharp, Peak, Valley
4. Sharp, Peak, Valley, Normal

TOU Season: The maximum season number is 12. Each season will operate on the TOU Schedule it is configured to.

TOU Schedule: The maximum schedule number is 14, where this parameter determines the number of TOU schedules available for the TOU calendar setting. Each schedule can be divided up into time segments and assigned a tariff.

- **Segment:** A segment is included in a schedule where each schedule can have up to a maximum of 14-time segments. Each segment is assigned a tariff.

TOU Holiday: A maximum of 30 holidays can be programmed into the TOU calendar. If the weekend and public holidays overlap, the public holiday overrides the weekend setting as the public holiday has a higher priority.

- **Weekend:** Users can enable the special weekend schedule configuration. The range is 1-12 for this setting.

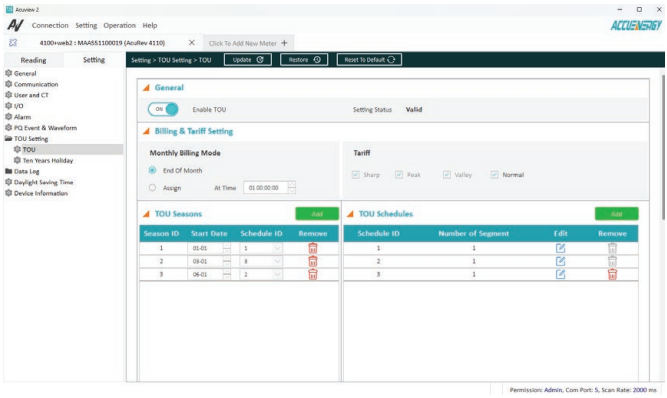


Figure 4-17 TOU Weekend Schedule

Ten Years Holiday: Users can enable the **Ten Years Holiday** schedule configuration. Users can set the starting year and ending year. Each year has a maximum of 30 holidays, and each holiday can be configured separately with a schedule ID. The year range must not exceed 10 years.

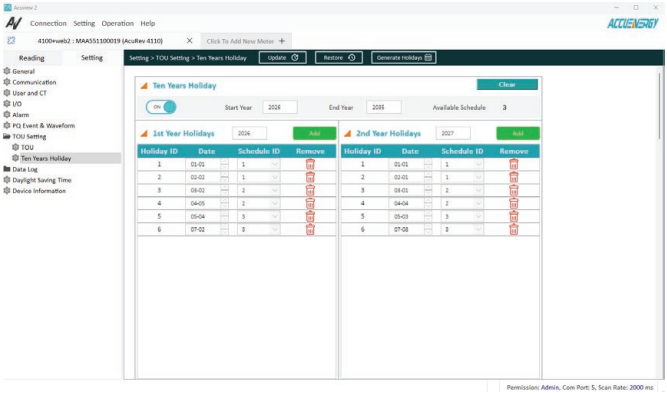


Figure 4-18 TOU Ten Years Holiday Schedule

By clicking **Generate Holidays,** users can quickly configure holiday settings.

Once the holidays for the first year are defined, click **Generate** to automatically apply the same settings to the remaining 9 years.

There are **seven holiday modes** available, each with a corresponding description.

Select the appropriate mode based on application requirements.

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If modifications are needed for a specific year, simply select the desired year and make the necessary changes.

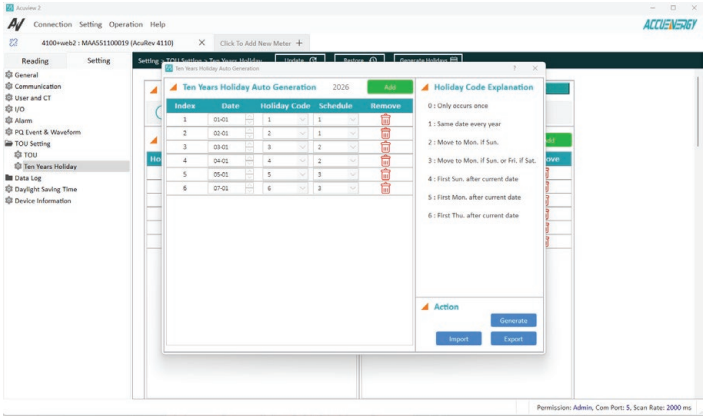


Figure 4-19 TOU Ten Years Holiday Auto-Generation

4.2.8 Data Log

The AcuRev 4100 is equipped with four independent data loggers, giving users the flexibility to capture, classify, and analyze measurement data in different ways. Each logger can be configured separately to meet specific monitoring and reporting needs.

- **Three Data Loggers (Real-Time Logging):**
  - Designed to record the **Instantaneous Values** of selected parameters.
  - Each logger can be configured independently to define:
    - The parameters to record.
    - The logging start time.
    - The logging interval.
- **One Trend Logger:**
  - Designed to record the **Maximum, Minimum,** and **Average Values** of selected parameters over time.
  - Can be configured independently to define:
    - The parameters to record.
    - The logging start time.
    - The logging interval.

By combining real-time data loggers with a trend logger, AcuRev 4100 allows to both monitor

instantaneous measurements and evaluate long-term trends, providing a complete picture of system performance.

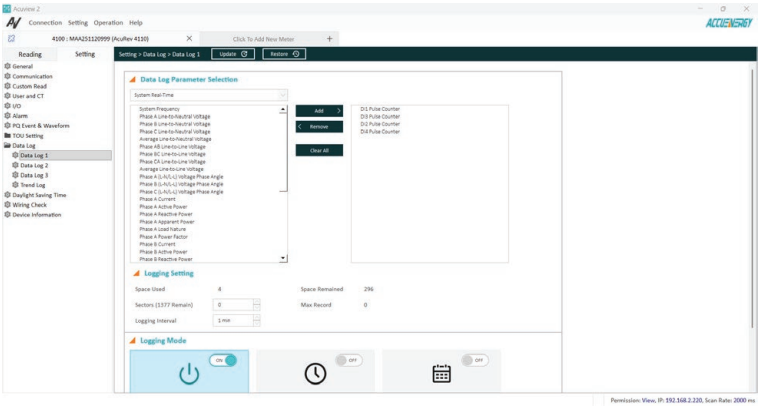


Figure 4-20 Data Log Parameter Settings

Selectable parameters are organized into main menu, secondary menu, and filter based third-level menu. Select the required menu from the drop-down list, then use Add, Remove, or Clear All to manage the parameters for logging.

Each secondary menu contains third-level menu based on measurement scope.

For example, Demand includes System Demand, Input Channel Demand, and User Channel Demand.

The available secondary menu categories are:

- **Data Log 1 to 3:**
  - Real-Time
  - Energy
  - Demand
  - THD
  - Sequence and Unbalance
  - Harmonics
  - DI
- **Trend Log:**
  - Real-Time
  - THD

- Sequence and Unbalance
- Harmonics
- DI

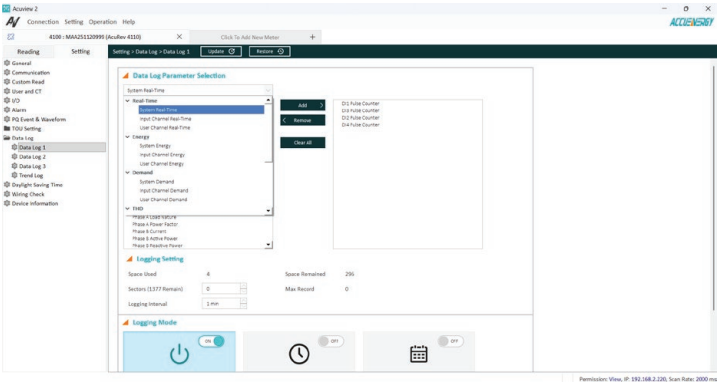


Figure 4-21 Data Log Drop Down Menu

Each data log can be configured to record a specific type of parameter. In total, up to 300 parameter entries can be selected for logging.

- **Data Log 1 to 3 (Real-Time Loggers):**
  - Combined Storage: **1,380 sectors**
  - Maximum Capacity: **7,516,380 records**
- **Trend Logger:**
  - Storage: **460 sectors**
  - Maximum Capacity: **2,512,060 records**

Logging Interval:

The logging interval can be configured from **1 to 1,440 minutes.**

This design gives users the flexibility to capture large volumes of high-resolution data or longer-term summarized trends, depending on the monitoring requirements.

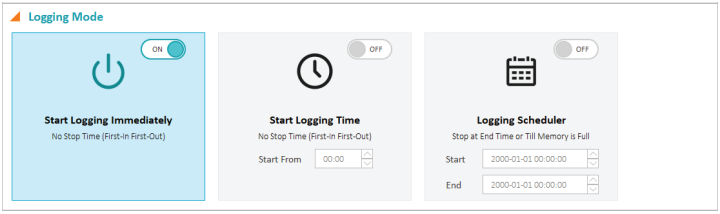


Figure 4-22 Logging Interval Mode

There are three logging modes:

1. **Start Logging Immediately:** Starts recording immediately after the update.
2. **Start Logging Time:** Sets a fixed time to start recording, with the time format as HH:MM.
3. **Logging Scheduler:** Sets a fixed period for recording, with the format as YYYY-MM-DD HH:MM:SS.

4.2.9 Daylight Saving Time

Users can enable or disable the DST function by toggling the **On/Off** switch located below the **Daylight Saving Time** option. Two date and time formats are available for selection:

1. **Format 1:** MM-DD HH:MM, which displays the month, date, and time.
2. **Format 2:** MM-WW-DAY HH:MM, which includes the month, week number, day of the week, and time.

Adjustment time range is 1 to 120 minutes.

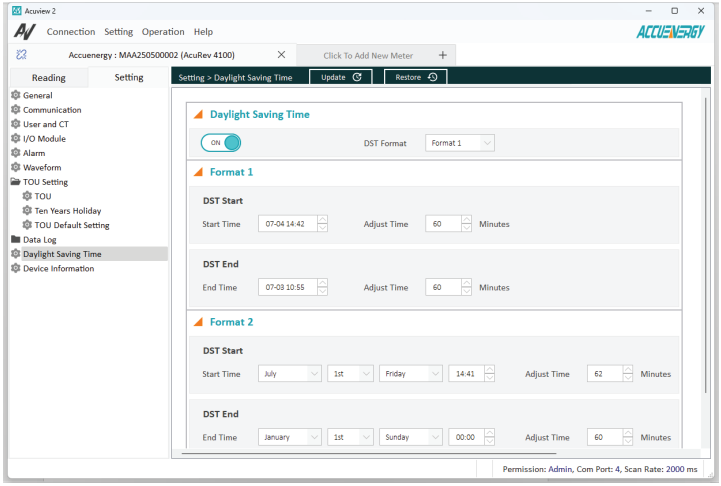


Figure 4-23 Daylight Saving Time Settings

4.2.10 Device Information

Users can view the software version information through Device Information.

Device Information	
Model	AcuRev-4110-mA
Serial Number	MAA551100019
Current Input	mA CT
MAC Address	30-7A-57-03-9A-D6
Hardware Version	v1.01
Firmware Version	v1.02p07
Bootloader Version	v1.02p03
Manufacturer	Accuenergy (Canada) Inc.

Figure 4-24 Device Information

4.2.11 Wiring Check

The AcuRev 4100 provides a Wiring Check function which is accessible from AcuHMI or the Acuview 2 software to detect wiring errors. The meter evaluates the configured wiring type and the live measurements, then displays the detected error type and a suggested corrective action.

Supported wiring types include 3E4W Wye, 2E3W Delta, 2E3W 1-Phase, 2E3W Network, and 1E2W.

The voltage check sequence is Missing, Reversed, then Phase Shift and the current check sequence is Missing, followed by Reversed and Phase Shift.

Result Synchronization

Wiring Check results are synchronized between the Acuview 2 software and the AcuHMI. Both interfaces will display the most recent result.

Result Reset

Wiring Check results are cleared and displayed as hyphen (-) when any of the following occurs:

1. Meter is power cycled.

2. Start of a new Wiring Check.
3. Factory reset is performed.
4. Wiring type is changed.
5. Input Wiring, Direction, Voltage Assignment, User Channel, CT Type, Primary, PT1, PT2, or Nominal Voltage settings is modified.

Limitations

1. A new Wiring check command is not accepted within 10 cycles of the previous check. This limitation is applicable to the Acuview 2 software and AcuHMI.
2. Under no-load conditions, current channels are reported as Missing.

INFO Before starting a Wiring Check, enter the correct Nominal Voltage, then click **Start** in the software or initiate the check through the AcuHMI.

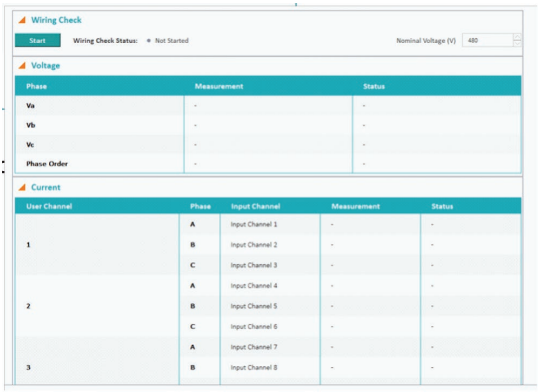


Figure 4-25 Wiring Check Settings

4.2.12 Custom Read

Custom Read allows group selected parameters into a custom block containing up to 120 register addresses. When the AcuRev 4100 receives a corresponding read command through Modbus, it returns the block of data in a single response.

Selectable parameter categories include Real-Time, Energy, Demand, THD, Sequence and Unbalance, Harmonics, and DI.

The **Custom Read** setting page provides the following items:

Parameter Category Selection

Filters the selectable parameter list by category.

Add / Remove

Adds the selected parameter to or removes it from the custom read list. Each entry shows the parameter name and its Modbus register address.

Clear All

Removes all parameters from the custom read list.

Space Used / Space Remained

Read-only fields showing the number of register addresses used and remaining, respectively, out of the maximum 120 addresses.

Click **Update** to save the configuration to the meter or click **Restore** to revert to the previously saved values.

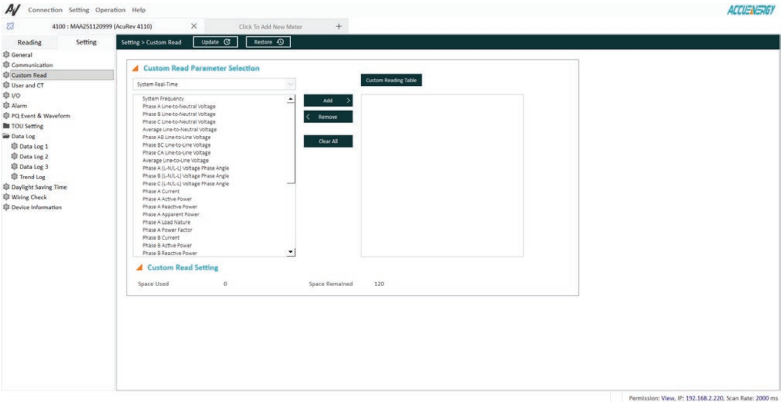


Figure 4-26 Custom Read Settings

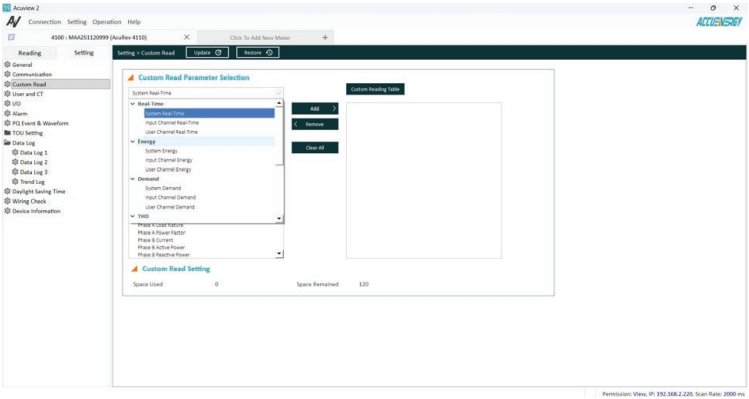


Figure 4-27 Custom Read Parameter Selection

4.3 Reading

4.3.1 Real-Time Metering

The AcuRev 4100 supports real time monitoring of parameters including voltage, current, frequency, and power. Voltage measurements includes line voltage, phase voltage, and line-to-neutral voltage phase angle. Current measurements are available for each input channel and in-line (total of all circuits). Active, reactive and apparent power and power factor are available for each channel and in-line values. Depending on the wiring mode configured in the meter, the view on Acuview 2 will be different.

Each page under the **Reading** menu has a **Save To File** button, allowing users to save data at any time.

By using the **User Channel** dropdown menu, users can view the real-time parameters for 24 input channels, such as current, power, and phase angle.

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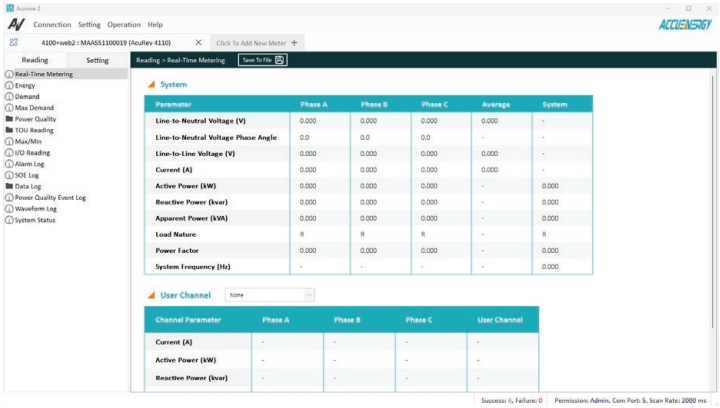


Figure 4-28 Real-Time Metering

INFO

- System readings display the total of phases A, B, and C, with all channels combined.
- The number of user channels varies depending on the wiring method and user mapping programmed.
- User channel current displays the user-defined values (1-12).

4.3.2 Energy

From the Acuview 2 software, users can view the energy readings for the meter. The top portion provides the total energy consumed by all circuits connected to the meter. This includes the active, reactive, and apparent energy. The **Clear Energy** button can be used to erase the existing energy data.

By using the **User Channel** dropdown menu, users can view the energy parameters for 24 input channels. The display parameters are as follows:

1. Import Active Energy (kWh)
2. Import Reactive Energy (kVArh)
3. Export Active Energy (kWh)
4. Export Reactive Energy (kVArh)
5. Net Reactive Energy (kVArh)
6. Total Reactive Energy (kVArh)
7. Apparent Energy (kVAh)

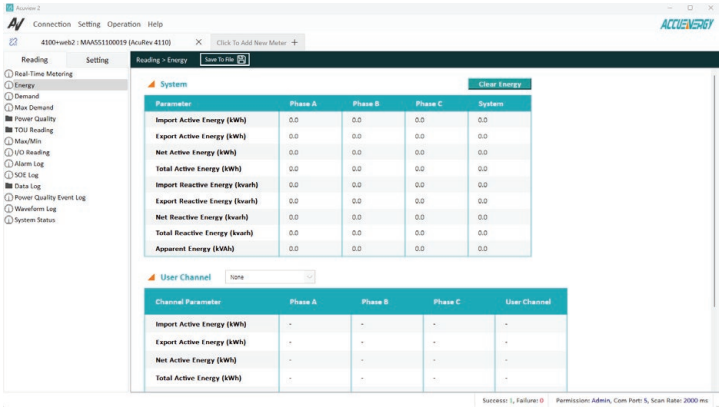


Figure 4-29 Energy Readings

4.3.3 Demand/Max Demand

The AcuRev 4100 demand readings can be found under the **Reading** tab by selecting **Demand.** The page displays the **Demand, Max Demand,** and **Max Demand Time** updated every second for power, reactive power, apparent power, and current. The page is divided into two sections, where the top part of the page shows the total demand readings for all circuits/ channels connected to the meter. The bottom half of the page is where users can select the individual channels/circuits to view the demand.

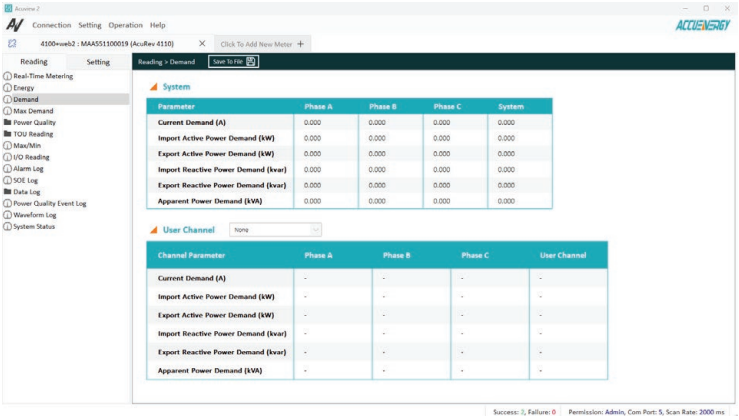


Figure 4-30 Demand Readings

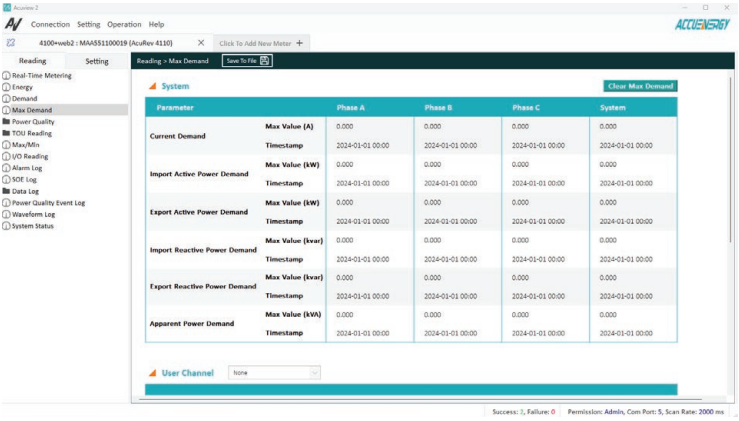


Figure 4-31 Max Demand Readings

Users can click **Clear Max Demand** to erase the existing **Max Demand** data.

> **INFO** Once cleared, the data cannot be recovered.

The number of resets and the time of the last reset will be recorded and displayed on the **Max Demand Reset** page under **Setting → General,** as **Max Demand Reset Count** and **Max Demand Reset Last Time.**

4.3.4 Power Quality

In Power Quality interface provides access to **THD, Harmonic Spectrum,** and **Sequence and Unbalance.** This interface allows users to monitor system-related power quality parameters and optionally view data for individual users.

In the **Harmonic Spectrum** interface, **Reset View** option is also available.

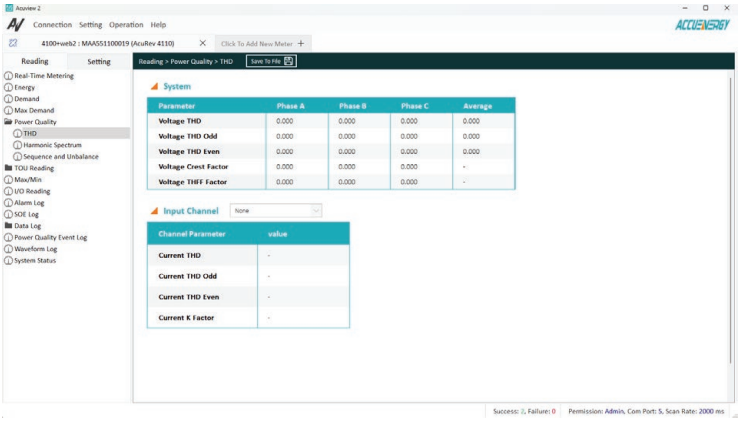


Figure 4-32 THD Parameters

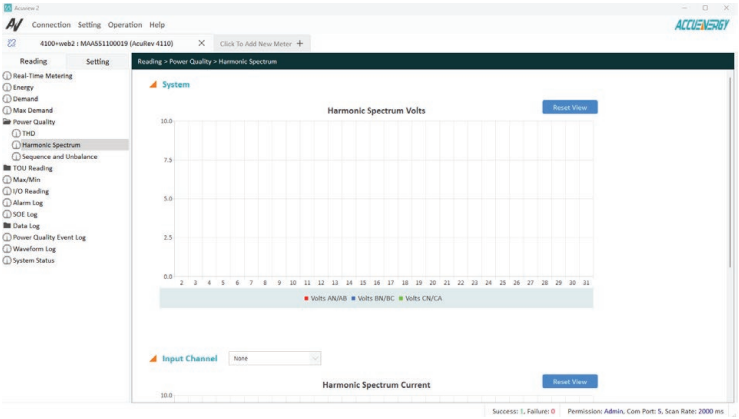


Figure 4-33 Harmonic Spectrum Parameters

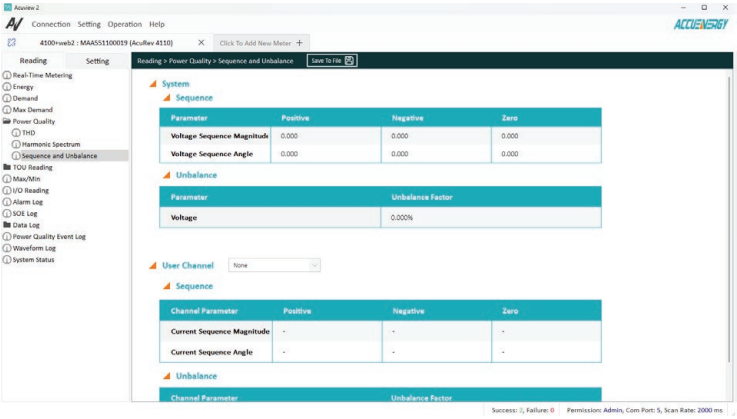


Figure 4-34 Sequence and Unbalance Parameters

4.3.5 TOU reading

The TOU reading interface provides four types of energy data.

- Current Month Accumulative TOU
- Previous Month Accumulative TOU
- Current Month Incremental TOU
- Previous Month Incremental TOU

For each type of energy data, users can view the system and the data for each individual user. A reset of the **Current Month Accumulative TOU** data is allowed if the meter has not yet been sealed.

Users can click on **Save To File** to download the data from Acuview 2. The data can be saved as a .csv format file.

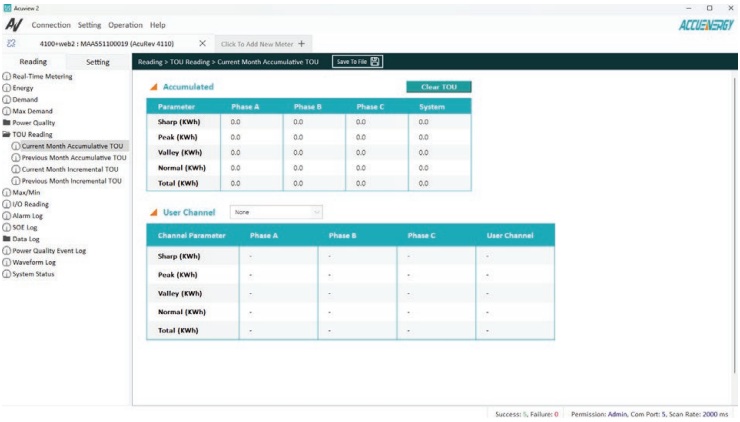


Figure 4-35 Current Month Accumulative TOU

4.3.6 Max/Min

The Max/Min interface displays the maximum and minimum values of key parameters, including voltage, current, frequency, harmonics, and power factor. Each recorded value includes a timestamp.

Users can select input channels and user channels to query the data.

By clicking **Clear Max Min,** the recorded values can be reset. To ensure the accuracy and timeliness of the data in **Max / Min,** the update interval is 60 milliseconds.

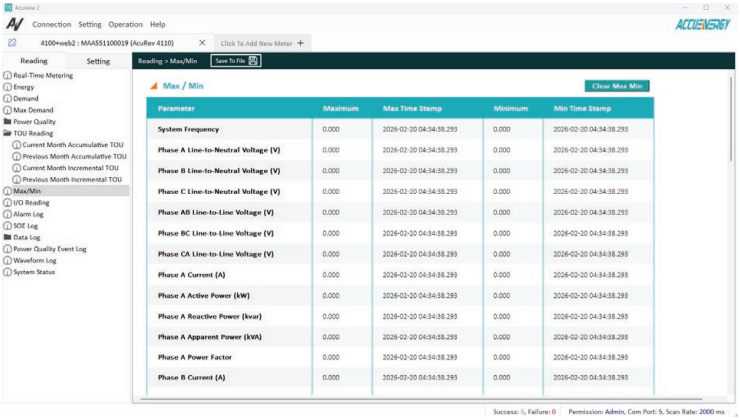


Figure 4-36 Max/Min Values

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4.3.7 I/O Module Reading

I/O module interface displays the status of **DI, DO,** and **RO.**

The **RO** can be manually triggered by clicking **Control.**

The **DI Counter** can be reset by clicking **Clear DI Counter.**

When the DO is configured as an **Alarm Indicator,** users can see the DO's real-time status, which is **OFF/ON.** When the DO is configured for **Energy Pulse Output,** the page displays the energy name and its corresponding value.

When the DI is configured for **Status Monitoring,** the page shows the DI's real-time status, which is **OFF/ON.** When the DI is configured for **Pulse Counting,** the page displays the DI count, pulse constant, and the converted physical measurement value.

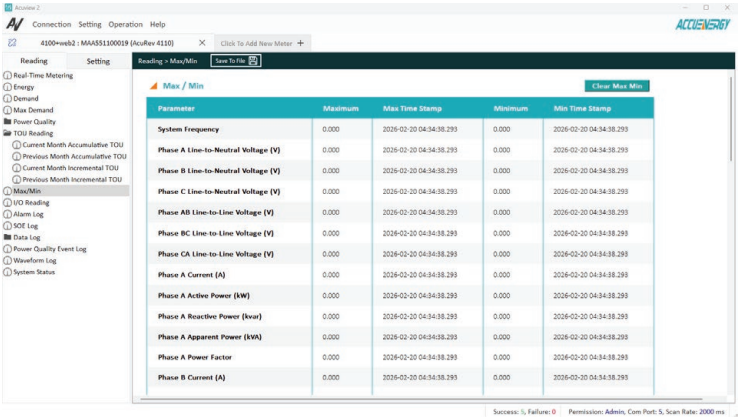


Figure 4-37 I/O Module Reading

4.3.8 Alarm Log

The alarms can be viewed in the **Alarm Log** under the **Reading** tab on Acuview 2. The alarm record shows the time of the alarm, the alarm ID, the alarm status, the extreme value, and the alarm duration.

Up to 200 alarms can be recorded and are overwritten beginning with the oldest entry in a first-in, first-out manner. Users can choose to read the latest 20, 60, or 200 records from the dropdown menu.

The software displays the newest alarm record number and allows users to reset the alarm log using the **Clear Log** button.

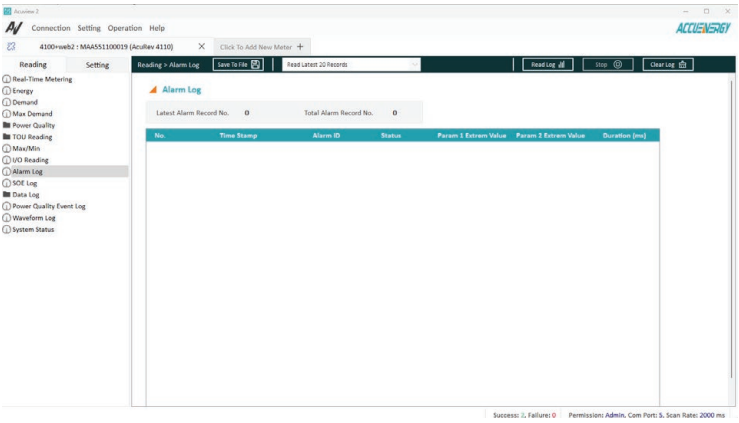


Figure 4-38 Alarm Log Parameters

4.3.9 SOE Log

Users can monitor the status changes of the four digital inputs (DI), with each event recorded along with a timestamp. The meter can store up to 200 event records. Users can choose to read the latest 20, 60, or 200 records from the dropdown menu.

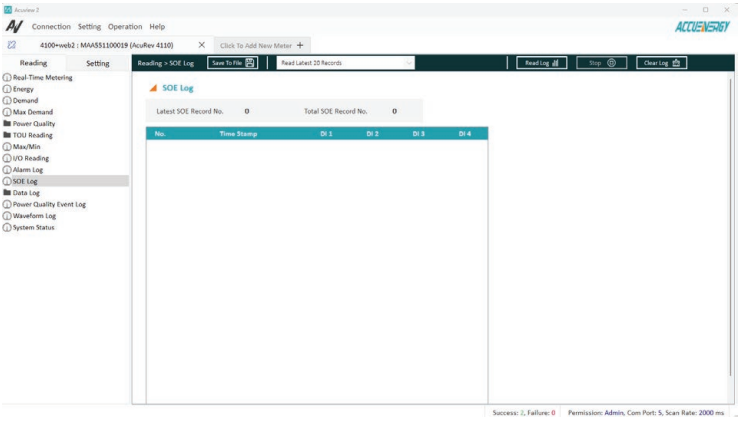


Figure 4-39 SOE Logs

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4.3.10 Data Log

Users can view all the data, including the first/last timestamp logged, maximum records, record size, and the number of used records.

Since the **Data Log** contains a large amount of data, reading it may take considerable time. To address the concern, multiple flexible reading methods have been designed, allowing users to operate quickly and efficiently.

In the first drop-down menu, users can select one of the three data logs, and in the second drop-down menu, users can select the number of records to read. The following options are available

1. Read newest 50 records
2. Read 1000 records
3. Read 64000 records
4. Read 1000 records (Select Time)
5. Read 64000 records (Select Time)

User can also set the record number from which to start to start reading the data log. Click **Read** to begin reading the data from the data log. Users can click on **Save To File** to download the data from Acuview 2. The data can be saved as a CSV file.

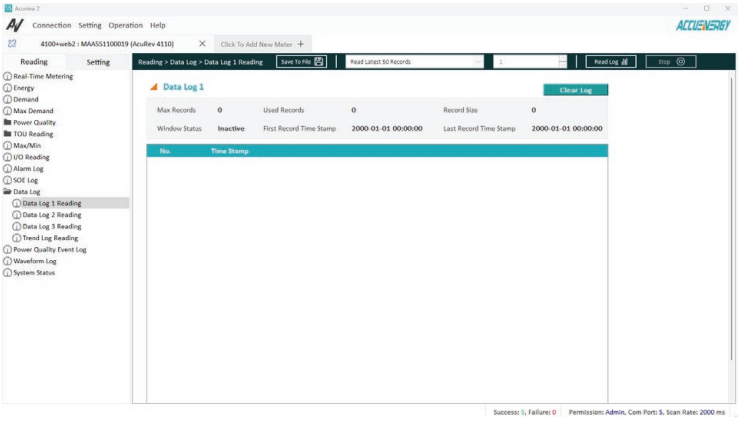


Figure 4-40 Data Log Reading

4.3.11 PQ Event Log

Users can view up to 200 power quality event records. Each record includes the following details:

1. Timestamp
2. Duration
3. Event type
4. Phase A/B/C Max and Phase A/B/C Min display the maximum and minimum values of voltage or current for each phase of the user channels, depending on the event type.
5. Associated waveform ID

Users can select the number of latest records to read (20, 60, or 200) with a dropdown menu.

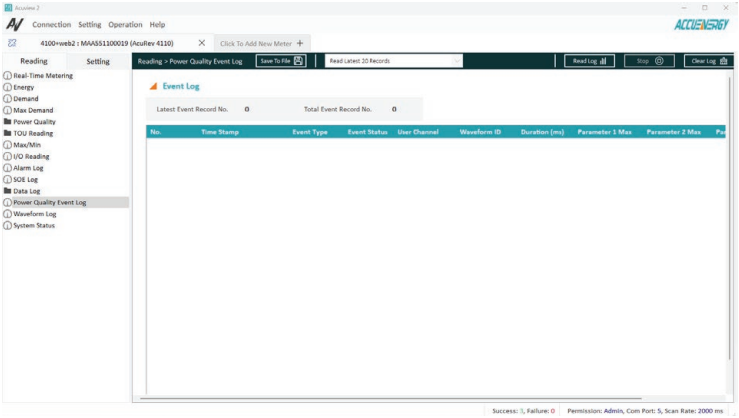


Figure 4-41 Event Log

4.3.12 ITIC/CBEMA Curve Report

The ITIC/CBEMA Curve Report plots recorded voltage swell and dip events against the ITIC/CBEMA voltage tolerance curve, as shown in the figure below.

1. Horizontal axis represents event duration in milliseconds (ms), while the vertical axis represents event voltage as a percentage of Nominal Voltage (%).
2. Upward-pointing triangles indicate event markers such as voltage swell events, and downward-pointing triangles indicate voltage dip events.
3. The background colors represent the severity zones such as critical, high concern, moderate concern, warning, and normal.
4. The start and end time fields specify the period for which events are displayed, and the

summary table below the chart shows the number of swell events, dip events, and total events within the selected period.

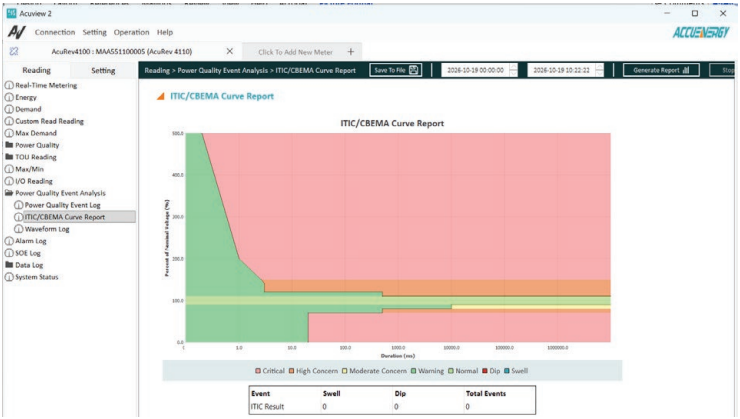


Figure 4-42 ITIC/CBEMA Curve Report

4.3.13 Waveform Log

Users can view up to 200 waveform log entries, displayed in first-in, first-out (FIFO) manner. Each entry includes a timestamp and trigger reason. The waveform log can be cleared using the C**lear Log** function.

Users can select any entry and click **Retrieve Waveform** to access the corresponding waveform data, which will be displayed as an animated waveform playback. If waveform retrieval needs to be stopped, users can click **Stop.** The waveform display can be reset using the **Reset View** option.

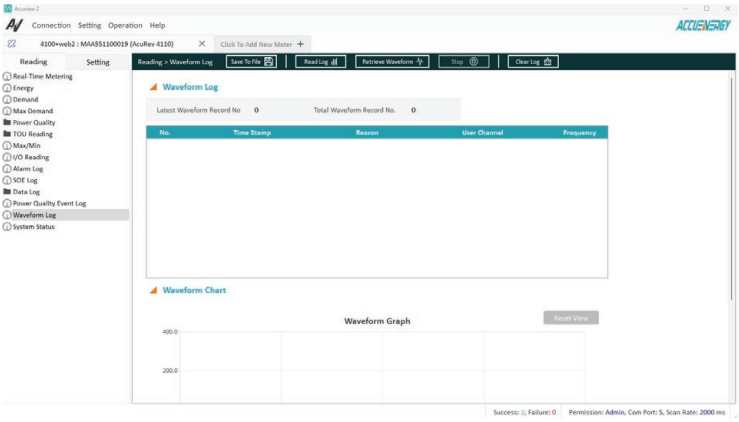


Figure 4-43 Waveform Log

4.3.14 System Status

Users can configure the device time using one of two methods, **Use PC Time** or **Use Custom Time.** The time format is **YYYY-MM-DD HH:MM:SS.**

After selecting the desired method, click **Set Time** to apply the setting.

The **System Status** section displays the following runtime information: **Device Run Time** and **Device Load Time.** These values can be reset using the **Clear** button.

At the bottom of the screen, the current **Seal Status** is shown. When the device is **Sealed,** the following functions are disabled:

1. **Reset Network:** Network configuration is reset to default settings. For the default configuration, read Chapter 2, Section 2.4.
2. **Factory Reset:** AcuRev 4100 will restore all configurations to factory defaults, and all data including data logs, alarm events, and SOE logs will be cleared. Please proceed with caution.

Users can click **Save To File** to export and save the current screen data to the local device.

If a device restart is required, click **Reboot Meter.**

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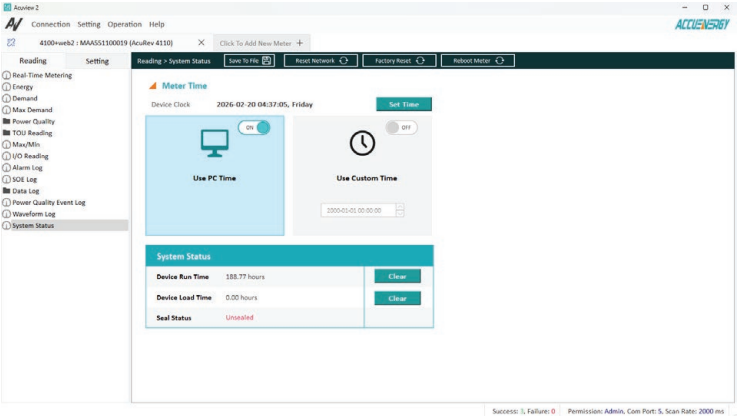


Figure 4-44 System Status

4.3.15 Custom Read Reading

User can view the values of the parameters configured in **Custom Read** settings, up to a maximum of 120 register addresses. Each entry shows the parameter name, value, and unit.

Click **Save To File** to export the data as a CSV file.

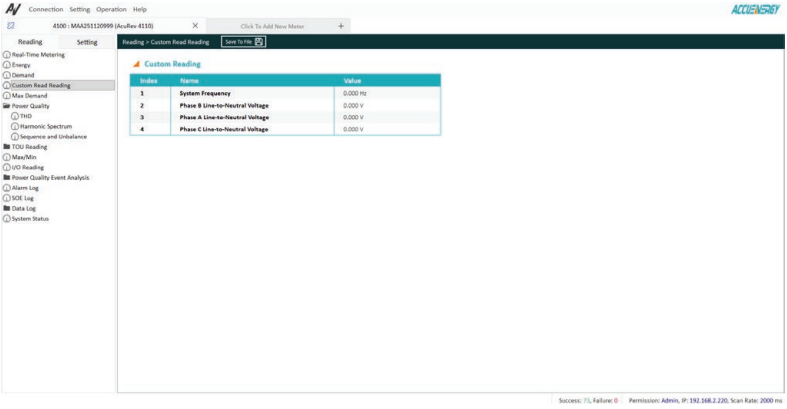


Figure 4-45 Custom Read Reading

Chapter 5: Communication

The AcuRev 4100 supports Modbus RTU and BACnet MS/TP, as well as Ethernet Modbus TCP.

Modbus TCP is a communication protocol that runs over Ethernet. Unlike Modbus RTU, which uses serial communication and a specific frame format with start/stop bits and CRC checks, Modbus TCP encapsulates the Modbus protocol within TCP packets. Key differences between Modbus RTU and Modbus TCP include:

Frame structure

Modbus RTU: Uses a compact binary frame with a CRC for error checking.

Modbus TCP: Adds a 7-byte MBAP (Modbus Application Protocol) header before the usual Modbus data; a CRC is not needed because TCP already ensures data integrity.

Port

Modbus TCP typically uses TCP port 502.

Transport

Modbus RTU: Used on serial lines (RS485/RS232).

Modbus TCP: Runs over standard Ethernet networks.

In short, Modbus TCP allows traditional Modbus messages to be transmitted reliably over Ethernet, making it easier to integrate with modern networked systems.

BACnet MS/TP (Master-Slave/Token-Passing) is a communication protocol commonly used in building automation systems. It runs over RS485 serial networks and uses a token-passing mechanism to control which device can transmit data at a given time, ensuring orderly communication. MS/TP supports multiple devices on a single bus and is widely used for connecting HVAC, lighting, and other building control devices.

Key points:

Transport: RS485 serial line.

Access method: Token-passing for bus arbitration.

Application: Building automation including HVAC, lighting, sensors.

AcuRev-4100 supports the mainstream open communication protocol Modbus. The standard configuration is Modbus RTU protocol. This manual only lists the Modbus RTU address table under the protocol. Other items, such as the BACnet MS/TP address table and EPICS, will be provided to customers in a separate document.

5.1 Modbus Introduction

AcuRev 4100 uses the Modbus RTU communication protocol. The Modbus protocol defines the check code and data sequence which are necessary for specific data exchange.

5.1.1 Transmission Mode

The transmission mode is a series of independent data structures within a data frame and a set of limited rules for data transmission. The transmission mode compatible with the Modbus RTU protocol mode is defined below.

Table 5-1 Transmission Mode

Parameters	Default Values
Coding System	8-bit
Start	1-bit
Stop	1-bit
Data	8-bit
Error Checking	CRC (Cyclic Redundancy Check)
Parity	No Parity / Odd parity / Even parity

5.1.2 Protocol

When a data frame arrives at the terminal device, it enters the addressed device through a simple port. The device removes the header of the data frame, reads the data, and if there is no error, it executes the data transfer. The requested task, then, adds the data the device generates to the header and returns the data frame to the sender. The returned response data contains content such as the terminal slave address (Address), the executed command (Function), the requested data (Data) generated by executing the command, and a check code (Check).

There will be no successful response if any error occurs.

1. Frame Format

Table 5-2 Data Frame Format

Address	Function	Data	Check
8-bit	8-bit	N * 8-bit	16-bit

2. Address Field: The address field is at the start of the frame. It is composed of 1 byte (8 bits). Its decimal value range is 0-247.
   A master addresses a slave by placing the slave address in the address field of the message. When the slave sends its response, it places its own address in this address field of the response to let the master know which slave is responding.
3. Function Field
   When a message is sent from a master to a slave device, the function code field tells the slave what kind of action to perform.

Table 5-3 Function Code

Code	Meaning	Action
01	Read DO Status	Obtain Digital (Relay) Output Status (ON/OFF)
02	Read DI Status	Obtain Digital Input 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 Specific Value into a Series of Consecutive Multiple-Registers

4. Data Field
   The Data Field contains the data that terminals need to complete the request and the data that terminals provide while responding to the request. This data may be a numerical value, address, or setting.
   For example, if the Function Code tells the terminal to read one register, the Data Field needs to specify the register to be read and how many registers to read.
5. Error Check Field
   The field allows the error check by master and slave devices. Due to electrical noise and other interferences, a group of data may be changed while transmitting from one location to the other.
   The Error Check Field ensures that master or slave devices do not respond to the distorted data during the transmission, which enhances system security and efficiency.
   Error Check uses 16-bit Cyclic Redundancy Check (CRC 16).

5.1.3 CRC Check

The Cyclic Redundancy Check (CRC) field occupies two bytes and contains a 16-bit binary value. The CRC value is calculated by the transmitting device and then appended to the data frame.

The receiving device recalculates the CRC value when receiving the data and then compares it with the value in the received CRC field. If the two values are not equal, an error will occur.

During the CRC operation, first preset a 16-bit register to all 1s, and then continuously calculate the 8 bits in each byte in the data frame with the current value of the register. Only 8 data per byte Bit participates in generating CRC. Start bit, stop bit, and possible parity bit do not affect CRC.

When generating the CRC, the 8 bits of each byte are XORed with the contents of the register. The result is then shifted to the low bit. The high bit is supplemented with 0, and the Least Significant Bit (LSB) is shifted out and checked.

If it is 1, the register is XORed with a preset fixed value (0A001H). If the lowest bit is 0, no processing is done.

The above processing is repeated until 8 shift operations are performed. After the last bit (the 8th bit) is shifted, the next 8-bit byte is XORed with the current value of the register, and the other 8 above are also performed.

When all the bytes in the data frame are processed, the final value generated is the CRC value

The process of generating a CRC is as follows:

1. Preset a 16-bit register as 0FFFFH (all 1s), which is called the CRC register.
2. Perform exclusive OR operation on the 8 bits of the first byte in the data frame and the low byte in the CRC register. Store the result back to the CRC register.
3. Shift the CRC register one bit to the right, fill the highest bit with 0, and move the lowest bit out and check.
4. If the lowest bit is 0, repeat Step 3. If the lowest bit is 1, connect the CRC register to a preset value. The fixed value (0A001H) is XORed.
5. Repeat Steps 3 and 4 until 8 shifts. A complete eight bits are processed in this way.
6. Repeat Steps 2 to 5 to process the next eight bits until all byte processing ends.
7. Swap the high and low bytes of the CRC register. The result is the CRC value.

5.2 Modbus Communication Format

The examples in this section will use the format shown in Table 5-4 as much as possible (all values are in hexadecimal).

Table 5-4 Protocol Example

Address	Function Data	Data Start Reg Hi	Data Start Reg Lo	Data # of Regs Hi	Data # of Regs Lo	CRC16 Hi	CRC16 Lo
01H	03H	20	00H	00H	02H	CFH	CBH

Address: Slave device address

Function Data: 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

5.3 AcuRev 4100 Application Details and Parameter Address Table

There are several conventions used by AcuRev 4100.

5.3.1 Data Type

Bit refers to one of the two binary bits, 0 or 1.

Word is a 16-bit unsigned integer, occupying a data address (2 bytes). The value range is 0~65535.

Int is a 16-bit signed integer, occupying a data address (2 bytes). The value range is -32768~32767.

Dword is a 32-bit unsigned integer, occupying two data addresses. The high word comes first, and the low word comes second (4 bytes). The value range 0~4294967295.

Rx = High Word × 65536 + Low Word.

Float is a single-precision floating-point number occupying two data addresses (4 bytes). The value range is 0.0~3.402823E + 38.

5.3.2 Data Scaling

The communication value of the instrument is not necessarily equal to the actual value. There is a certain conversion relationship between them.

The production of the upper-level software must make it clear which conversion relationship is used for the collected parameters; otherwise, it will lead to wrong results.

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