

AcuRev 1320 Series
DIN Rail Power & Energy Meter
User Manual





ACCUENERGY

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Please read this manual carefully before installation, operation, and maintenance of the AcuRev 1320 DIN Rail Power & Energy Meter.

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

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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 1320 DIN Rail Power & Energy Meter.

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 warning of danger or risk during the installation and operation of the meters.

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 or operational circumstance, if not considered, may result in injury or loss of data.

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

AcuRev 1320 is a DIN-rail three-phase Power and energy meter designed for tenant billing solution with high-accuracy measurement, flexible data logging, and industrial communication capabilities. It supports advanced power quality monitoring, event logging, and waveform capture, with a built-in colour HMI for local reading and configuration. There are 2 function models:

- AcuRev-1321 is the standard model for revenue-grade energy meter.
- AcuRev-1322 is the advanced model for Class S power quality analyzer.

Each model has several variants, distinguished by current input type and by the metrological approval or the meter certification. The variant is identified by the suffix on the model number and is fixed at manufacture; it cannot be changed in the field.

Table 1-1 AcuRev 1320 Series Models

Model	Certification
AcuRev-1321-mA AcuRev-1322-mA AcuRev-1321-mV AcuRev-1322-mV	UL / CE
AcuRev-1321-mA-MC AcuRev-1322-mA-MC	Measurement Canada
AcuRev-1321-mA-MD AcuRev-1321-mV-MD AcuRev-1322-mA-MD AcuRev-1322-mV-MD	MID
AcuRev-1321-mV-CP AcuRev-1322-mV-CP	CTEP

1.2 Areas of Application

- Energy Management in Industrial and Commercial Buildings
- Submetering for Tenant Billing
- Data Centers and Power Distribution Units (PDUs)
- Power Quality Monitoring

- Integration with Building Management Systems (BMS)
- Distributed Energy Resources (DER) Monitoring
- Railway and Subway Systems
- Industrial and Utility Applications

1.3 Key Features

Revenue-Grade Measurement & Accuracy

Supports 3 voltage inputs, Va, Vb, and Vc with direct connection at 69 - 480 VAC L - N / 69 - 830 VAC L - L, and 4 current inputs supporting 80 mA and 100 mA output CTs, 333 mV output CTs, and Rogowski coils. Complies with IEC 62053-22 Class 0.1S for active energy. Supports six service configurations:

- 1 Element 2 Wire
- 2 Element 3 Wire 1 Phase
- 2 Element 3 Wire Delta
- 2 Element 3 Wire Network
- 3 Element 4 Wire Wye
- 3 Element 4 Wire Delta

Flexible Wiring Configuration

- **Current Channel Remapping:** Reassign any current input to any phase to resolve crossed CT connections using software.
- **Current Input Direction:** Allows forward or reverse configuration to rectify reversed current input connections.
- **Independent Input Channel:** When enabled, each current input can be paired with any voltage input such as Va, Vb, Vc, Vab, Vbc, or Vca which allows power and energy to be calculated and accumulated per channel. Ideal for multi-load or multi-tenant panels metered from a single device.

Dual Source Energy

Designed for sites with two energy sources, such as a utility grid feed and on-site photovoltaic generation.

- Accumulates energy separately for Grid and Generation sources.
- Source selection is driven by configurable switching logic, so every kWh is attributed to the selected generating source.

- Can eliminate the need for a second meter to separate utility consumption from renewable generation.

Data Logging

Includes 3 data loggers and 1 trend logger that can be independently configured for periodic measurement logging.

Alarm Monitoring

- 20 configurable alarm groups monitoring up to 40 parameters.
- Combinations with AND / OR logic across conditions for precise alarm triggering.
- Onboard storage for up to 200 timestamps of alarm records.

Integrated Communication Support

Directly connect to building automation, SCADA, or AcuCloud without additional gateways.

- **RS485:** Modbus RTU and BACnet MS/TP.
- **Dual Ethernet Ports:** Modbus TCP and BACnet/IP communication.
- **Built-in Web Server:** Secure HTTPS access to live readings, logs, and device configuration from any browser. No software installation is required. Each meter ships with a unique default password, and web access can be disabled when not in use.
- **Automated Data Push:** Schedule log delivery over HTTP/HTTPS to client server or directly to AcuCloud.

On-Board I/O Functions

- **Digital Inputs:** 3 configurable inputs for equipment status monitoring, Sequence of Events (SOE) logging, or pulse input.
- **Digital Outputs:** 1 configurable output for event and alarm triggering or pulse output.

Multi-Tariff Time of Use (TOU)

Bill tenants accurately against complex utility rate structures directly in the meter, with no external software.

- 4 tariff rates including sharp, peak, valley, and normal which is equivalent to critical peak, on-peak, off-peak, and shoulder rates in North American utility tariffs.
- 14 seasonal schedules with 14-time segments each, for rate structures that change through the year.

- Separate weekend rate assignment.
- 10-year holiday calendar for jurisdictions that apply off-peak rates on statutory holidays.

Power Quality Analysis

- AcuRev-1322 provides Class S measurement as per IEC 61000-4-30, with power quality instrument requirements specified by IEC 62586 standards.
- 1-cycle parameter update with configurable aggregation intervals.
- Detect power quality events which triggers waveform capture.

System Logs

- Audit Log: Secure audit trail focused on metering integrity and compliance. Recorded on all models and available for viewing in Acuview 2 on MID certified (-MD) models.
- System Event Log: Diagnostic log for operation, troubleshooting, and fault detection.

I/O Expansion Module

The expansion module extends inputs and outputs functionality of AcuRev 1320 with additional digital inputs and digital outputs.

Human-Machine Interface (HMI)

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

Chapter 2: Installation



ELECTRIC HAZARD

The installation of AcuRev 1320 must be performed by qualified, competent, and accredited professionals who have received formal training and experienced with high-voltage and high-current devices. Appropriate personal protective equipment such as insulating gloves, safety glasses, and an arc flash suit rated for the available incident energy is mandatory.

Before handling the meter:

De-energize and ground all circuits before installation, wiring, or maintenance.

Verify the absence of voltage with a properly rated tester before making contact with any conductor.

Short and ground the secondary of every current transformer before disconnecting any current input. An open CT secondary can develop lethal voltages.

Confirm that supply voltage and input signals are within the ratings on the meter label and in the specifications before energizing.

During normal operation:

Caution should be exercised when handling the terminal blocks, current transformer and potential transformer connection nodes, as high voltage may be present.

All primary and secondary circuits may contain hazardous current and voltage.

Install the meter and I/O modules on the secondary side of current transformers only. Never install it on the primary side, or in any location subject to VA limitations.

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

Do not perform dielectric withstand or insulation resistance testing on the input, output, or communication terminals.

The use of CT shorting blocks and appropriately rated fuses on voltage input is strongly recommended.

De-energize the meter before cleaning. Clean the enclosure with dry cloth only. Do not use liquids, solvents, or abrasive cleaners.

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.

This chapter describes the mounting and wiring procedures for the AcuRev 1320. Read it completely before beginning installation.

2.1 Appearance and Dimensions

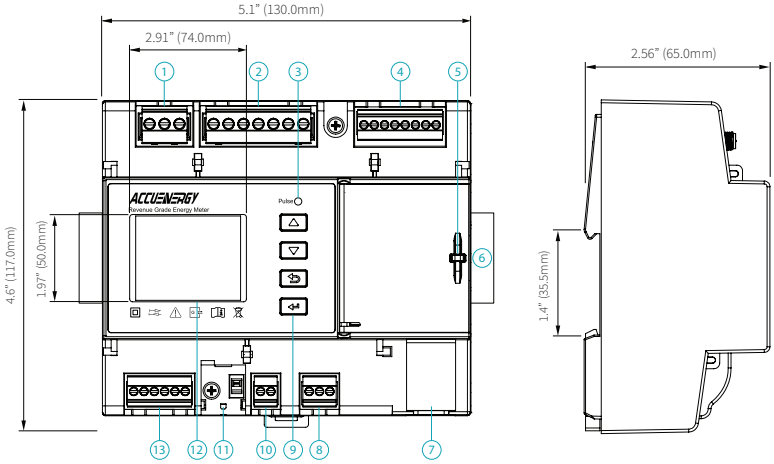


Figure 2-1 AcuRev 1320 Series Appearance and Dimensions

Table 2-1 Part Number and Description

Number	Description
1)	Power supply terminals.
2)	3-phase voltage and neutral terminals.
3)	Pulse LED indication.
4)	4 channel current input.
5)	Communication expansion module port.

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Number	Description
6)	DIN rail for device mounting.
7)	Dual Ethernet ports.
8)	RS485 communication port.
9)	Four buttons to navigate display and settings.
10)	1 channel digital output port.
11)	Seal / Unseal button.
12)	Onboard full colour display.
13)	3 channel digital input port.

2.2 Installation Conditions

Environmental

Verify that the installation site meets the following conditions before mounting the meter. Operating outside the specified limits may damage the meter.

Table 2-2 Environmental Operating Limits

Parameter	Specification
Pollution Degree	2
Rated Operating Range	–25 °C to +70 °C (-13 °F to +158°F), 0 % to 75 % RH
Limit of Operation	–40 °C to +85 °C (-40 °F to +185°F), 0 % to 95 % RH
Storage and Shipping Range	–40 °C to +85 °C (-40 °F to +185°F), 0 % to 95 % RH
Altitude	0 m to 2000 m
IP Rating	IP54: Panel mount and front screen display. IP30: Panel mount rear, DIN-rail mount, and I/O modules. It is recommended to install in a cabinet or enclosure with an IP54 rating or higher.

Location

Install the meter in a dry, dust-free environment indoors. Avoid locations exposed to direct sunlight, radiated heat, corrosive atmospheres, or strong sources of electrical noise such as variable frequency drives, welding equipment, and switchgear operating coils.

INFO Sustained operation near the upper or lower temperature limit will shorten the service life of the meter. Where possible, install the AcuRev 1320 in an enclosure maintained within 0 °C to 50 °C (32 °F to 122 °F).

2.3 Installation Procedure

The AcuRev 1320 can be installed using two methods - cabinet or flush panel installation. Both methods use a standard 35 mm DIN rail. Select the installation method based on whether access to the meter display and keypad is required during normal operation.

Before installation, verify that the installation location meets the environmental requirements specified in Table 2-2 and that sufficient clearance is available for wiring, operation, and maintenance of the meter.

2.3.1 Cabinet Installation

In this installation method, the AcuRev 1320 is mounted on a standard 35 mm DIN rail inside a fully enclosed switchboard or panel board. The cabinet door is closed after installation, and the meter is not visible from outside. This is suitable for installations where direct access to the meter display is not required during normal operation.

Installation Steps

1. The AcuRev 1320 mounts on a standard 35 mm (1.38") DIN rail in accordance with EN 60715. Pull down the mounting clip on the rear of the meter.
2. Place the meter on the rail, ensuring the rail is flush against the back of the housing. Push the clip in until it clicks. The click confirms the meter is locked to the rail.

> **INFO** When installing the meter in switchboards or panel boards, sufficient clearance must be maintained at the front, rear, top, and bottom of the AcuRev 1320 to facilitate wiring and removal.

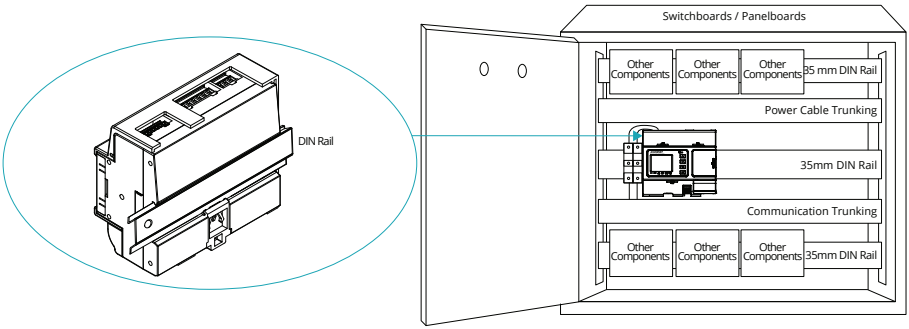


Figure 2-2 Meter Installation Methods

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

2.3.2 Flush Panel Embedded Installation

In the embedded flush panel installation, the AcuRev 1320 is mounted on a standard 35 mm DIN rail inside an enclosure. A cut-out on the cabinet door allows the AcuRev 1320 display and four keypad buttons to be visible and accessible from outside without opening the door. This method is ideal for applications where frequent local reading or on-site configuration is required.

Panel Cut-Out Requirements

A cut-out must be made in the cabinet door or panel surface to expose the AcuRev 1320 display and keypad. The cut-out must be precisely aligned with the meter's front face position when mounted on the DIN rail inside the enclosure. Refer to the dimensional drawing in Section **2.1 Appearance and Dimensions** for exact outline dimensions and positioning.

Installation Steps

1. Cut an opening in the cabinet door or panel surface according to the dimensions specified in Section **2.1 Appearance and Dimensions.**
2. Pull down the mounting clips at the rear of the meter.
3. Mount the meter on the DIN rail inside the enclosure. Ensure the rail fits tightly against the back of the meter and push the clips back in until a click sound is heard.
4. Position the DIN rail so that when the cabinet door is closed, the meter's front face aligns with and is fully visible through the cut-out opening.
5. Close the cabinet door and verify that the meter display is fully visible and all four buttons are accessible through the cut-out opening.

INFO Ensure cut-out edges are smooth and free of burrs to avoid damage to the meter's front bezel. Sufficient clearance must be maintained inside the enclosure at the rear, top, and bottom of the device to facilitate wiring and removal.

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

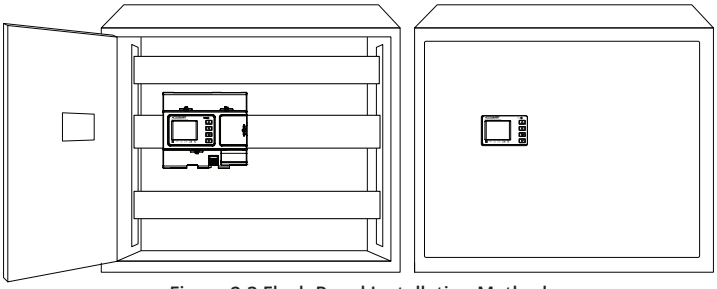


Figure 2-3 Flush Panel Installation Method

2.4 Wiring Configuration

2.4.1 Terminals

The upper section of the AcuRev 1320 has the power supply, voltage, and current input terminals, while the lower section includes the digital inputs and output, seal button, RS485, and dual Ethernet Ports.

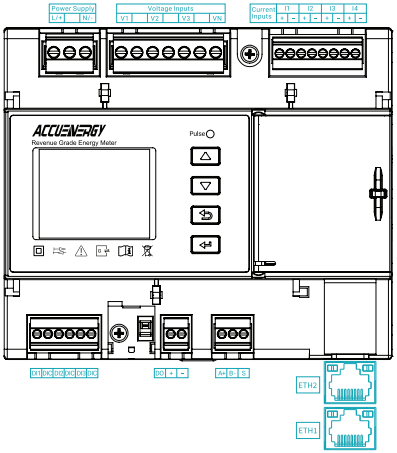


Figure 2-4 AcuRev 1320 Terminals

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Table 2-3 AcuRev 1320 Terminal Specifications

Terminal Name	Function	Terminal Type	Terminal Aperture	Screw Torque
V1, V2, V3, VN	Three-Phase Voltage Input Port	Plug-In	3.3 mm² (12 AWG)	0.66 N·m (6.0 in-lbs)
L/+, N/-	Power Supply	Plug-In	3.3 mm² (12 AWG)	0.66 N·m (6.0 in-lbs)
A+, B-, S	RS485 Communication Port	Plug-In	1.3 mm² (16 AWG)	0.2 N·m (1.7 in-lbs)
DI1, DI2, DI3	3-Channel Digital Input Port	Plug-In	1.3 mm² (16 AWG)	0.2 N·m (1.7 in-lbs)
DO	1-Channel Digital Output Port	Plug-In	1.3 mm² (16 AWG)	0.2 N·m (1.7 in-lbs)
I1, I2, I3, I4	4-Channel Current Input Port	Plug-In	1.3 mm² (16 AWG)	0.2 N·m (1.7 in-lbs)
ETH1, ETH2	Ethernet Port	Plug-In	N/A	N/A

INFO It is recommended to use 0.8 - 1.3 mm² (18-16 AWG) copper conductors for Current Input, Digital Input, and Digital Output terminals.

INFO It is recommended to use 1.3 - 3.3 mm² (16-12 AWG) copper conductors for Voltage Input and Power Supply terminals.

2.4.2 Wiring Methods

The AcuRev 1320 can be used to measure single-phase, two-phase, and three-phase electrical circuits.

2.4.2.1 Control Power Wiring

The AcuRev 1320 supports both control power at 100 – 300 V AC, CAT III or 100 – 480 V AC, CAT II at 50 / 60 Hz. Contact Mod-Tronic if a different supply is required.

INFO The 480 V AC rating applies to line-to-line connections only.

AcuRev 1320 draws less than 6 W, control power may be supplied from a dedicated auxiliary circuit rather than the measured circuit. If the supply voltage is unstable, use a voltage regulator or conditioned supply. A fuse (20 A / 600 VAC) is mandatory for the AcuRev 1320 power supply.

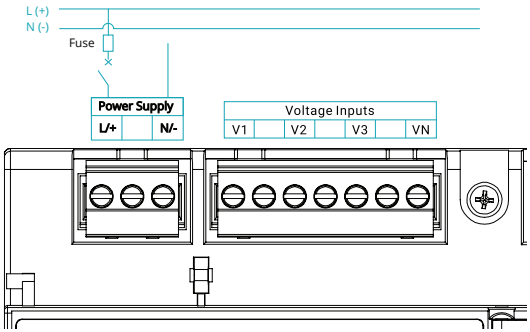


Figure 2-5 Power Supply Wiring

INFO Safety certification testing was conducted under AC operating conditions.

2.4.2.2 Voltage Input Wiring

The voltage inputs accept 69 – 480 V AC line-to-neutral or 69 – 830 V AC line-to-line, rated CAT III. Do not apply voltage above the specified limits.

Install a 1 A / 500 V AC fuse in each voltage input conductor. Fuses must be rated for the available fault current at the point of connection.

Voltage input connections depend on the service configuration. Refer to the wiring diagrams in the current input wiring section.

2.4.2.3 Current Input Wiring

AcuRev 1320 supports up to 4 current inputs. To connect the current input terminals:

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

The AcuRev 1320 supports six different service configuration. Refer to the corresponding diagrams below.

1 Element 2 Wire

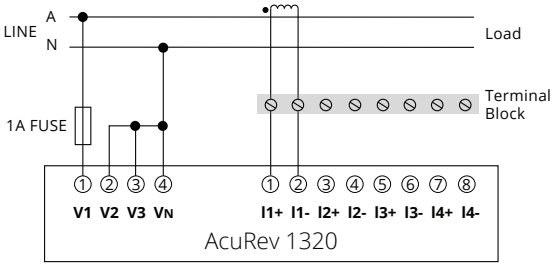


Figure 2-6 1 Element 2 Wire Connection

2 Element 3 Wire 1 Phase

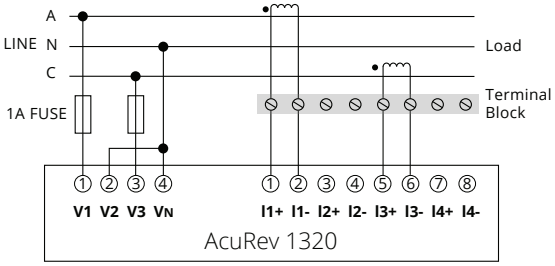


Figure 2-7 2 Element 3 Wire 1 Phase Connection

2 Element 3 Wire Delta

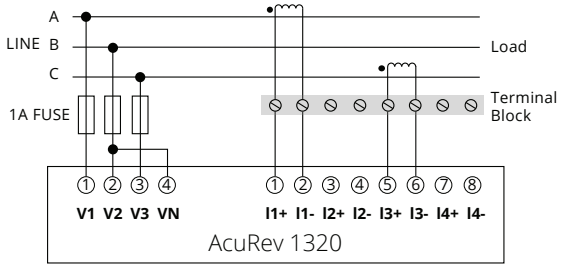


Figure 2-8 2 Element 3 Wire Delta Connection

2 Element 3 Wire Network

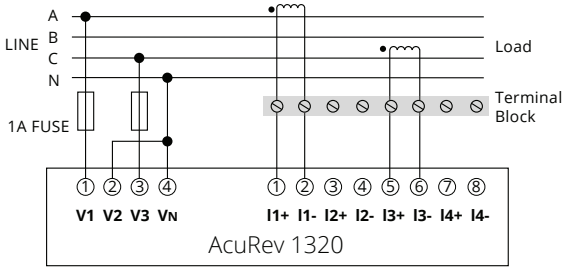


Figure 2-9 2 Element 3 Wire Network Connection

3 Element 4 Wire Wye

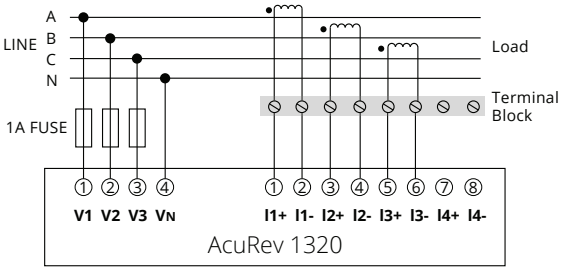


Figure 2-10 3 Element 4 Wire Wye Connection

3 Element 4 Wire Delta

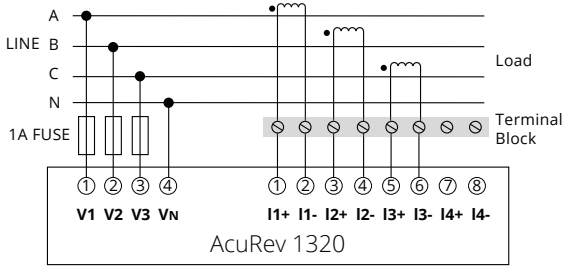


Figure 2-11 3 Element 4 Wire Delta Connection

2.4.2.4 RS485 and Ethernet Connection

Ethernet

The meter can be connected to the network using a CAT5e or better Ethernet cable. The interface operates at 10 / 100 Mbps and supports both static IP addressing and DHCP. Network settings can be configured through the meter's display, the built-in web server, or Acuview 2 software.

RS485

For Modbus RTU communication over RS485, the cable run should not exceed 1200 m (4000 ft). A shorter run is recommended when multiple devices share the same network or when operating at a higher baud rate. If the master device provides only an RS232 or USB port, an RS232-to-RS485 or USB-to-RS485 converter can be used.

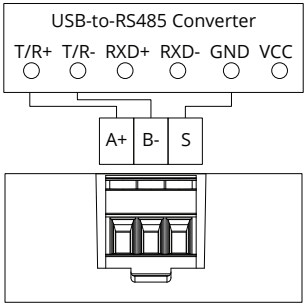


Figure 2-12 RS485 Wiring

To improve RS485 communication quality:

- Use a shielded 16 AWG 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. A 120 Ω / 0.25 W termination resistor 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: None (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.

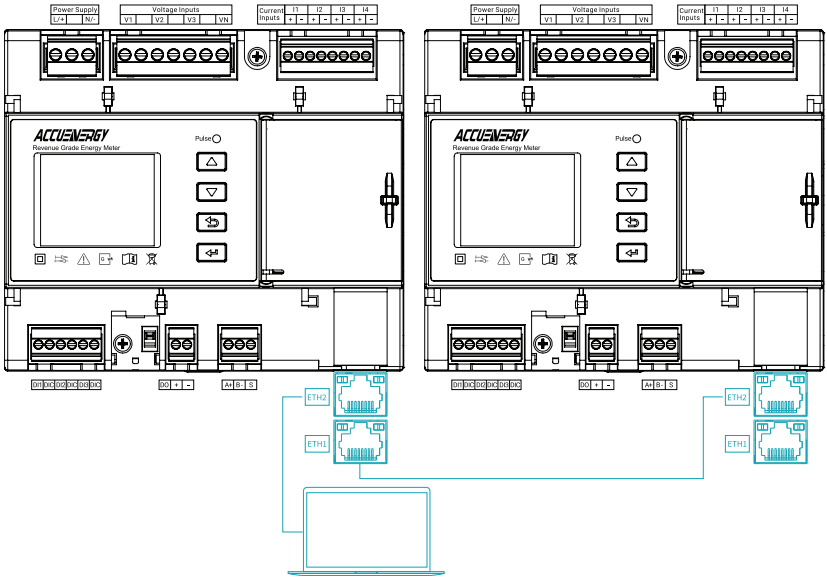


Figure 2-13 Ethernet Daisy-Chain Connection

2.4.2.5. I/O Wiring

Digital Input Wiring

The AcuRev 1320 digital inputs are dry contacts, requiring an external excitation supply of 20 - 30 V AC or 20 - 60 V DC.

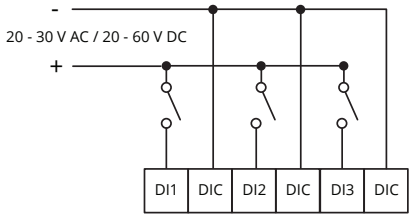


Figure 2-14 DI Wiring

Table 2-4 DI Specifications

Parameter	Specification
Digital Inputs Type	Dry Contact Requires External Excitation
External Supply	20 - 30 V AC or 20 - 60 V DC
Maximum Input Frequency	50 Hz at 50% Duty Cycle (10 ms ON, 10 ms OFF)
SOE Resolution	2 ms
On-State Voltage	15 V
Off-State Voltage	5 V
Isolation Voltage	2500 V AC

Digital Output Wiring

The DO port is designed with a Photo-MOS switch and can only drive low-power loads. The rated switching voltage and current should not be exceeded.

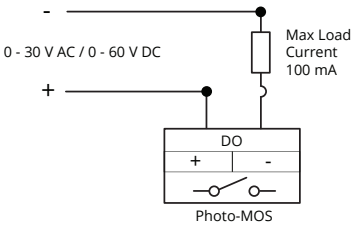


Figure 2-15 DO Wiring

Table 2-5 DO Specifications

Parameter	Specification
Digital Output Type	Photo-MOS Switch
Voltage Range	0 - 30 V AC or 0 - 60 V DC
Maximum Load Current	100 mA
Maximum Pulse Frequency	25 Hz with 50% Duty Cycle (20ms ON, 20ms OFF)
Isolation Voltage	2500 VAC for 1 minute

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Chapter 3: Meter Display Screen & Parameter Settings

3.1 HMI and Keys

The AcuRev 1320 features a colour display with four navigation keys, allowing readings and configuration to be accessed directly at the meter without additional software. See Section 2.1 for dimensions.

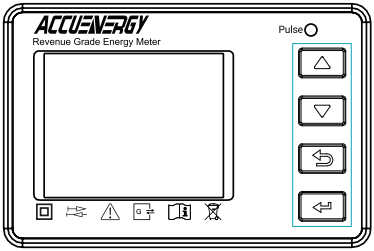


Figure 3-1 AcuRev 1320 HMI Display and Navigation Keys

Table 3-1 Function Keys Illustration

Keys		Functions
△	Up	Increment the value in edit mode. Navigate between menu items. Switch to the previous page.
▽	Down	Move to the next digit or field in edit mode. Navigate between menu items. Switch to the next page.
⮌	Return	Return to the previous menu.
↵	OK	Confirm the settings. Enter the next level of menu. Enter edit mode.

Startup

When the AcuRev 1320 is powered on or reset, the Accuenergy logo appears for approximately two seconds. Key input is disabled during this time. The main menu appears once startup completes.

Navigation

Use the four keys, Up, Down, Return, and OK to navigate between menu options. The highlighted display is the current selection. Press **OK** to enter the selected option or **Return** to move back one level.

Entering the settings password

Access to the Settings menu is password-protected. To enter the password:

1. Press **Up** to increment the first digit until the correct value is shown.
2. Press **Down** to move to the next digit.
3. Repeat until all four digits are set.
4. Press **OK** to confirm.

The default password is **0000.** Accuenergy recommends changing it during commissioning to prevent unauthorized configuration changes.

If the password is lost, contact Mod-Tronic Technical Support for assistance.

Main Menu

This menu provides access to four main options.

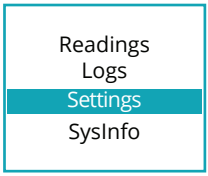


Figure 3-2 Main Menu

Table 3-2 Main Menu Description

Parameter	Description
Readings	Real-Time Measurements, Demand, Energy, Power Quality, and I/O Status.
Logs	Stored Power Quality Events, Alarms, SOE, Audit, and System Records.
Settings	Password Protected - Meter Configuration, Wiring, Communications, and I/O.
SysInfo	Device Identification, Firmware Versions, Seal Status, and Runtime.

3.2 Readings Menu

3.2.1 Real-Time Screen and Operation

To view real-time measurements:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Realtime** and press **OK.**
3. Select either **Phase** or **System** and press **OK.**
4. Use the **Up** and **Down** keys to scroll through the available parameters.
5. Press **Return** to move back one level.

Phase Parameters

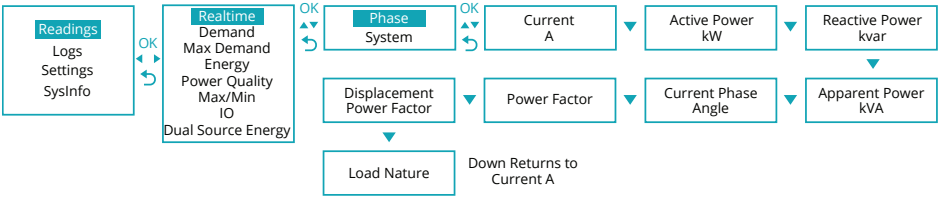


Figure 3-3 Phase Parameters Flowchart

Table 3-3 Phase Parameters Description

HMI Label	Parameter	Unit	Applicable Domain
I	Current	A	A, B, C, N, Avg
P	Active Power	kW	A, B, C, System
Q	Reactive Power	kvar	A, B, C, System
S	Apparent Power	kVA	A, B, C, System
I ANG	Current Phase Angle	°	A, B, C, N
PF	Power Factor	-	A, B, C, System
Displacement PF	Displacement Power Factor	-	A, B, C
LN	Load Nature	-	A, B, C, System

System Parameters



Figure 3-4 System Parameters Flowchart

Table 3-4 System Parameters Description

HMI Label	Parameter	Unit
Freq	System Frequency	Hz
Van	Phase A Line-to-Neutral Voltage	V
Vbn	Phase B Line-to-Neutral Voltage	V
Vcn	Phase C Line-to-Neutral Voltage	V
Vlnavg	Average Line-to-Neutral Voltage	V
Vab	Phase A to B Line-to-Line Voltage	V
Vbc	Phase B to C Line-to-Line Voltage	V
Vca	Phase C to A Line-to-Line Voltage	V
Vllavg	Average Line-to-Line Voltage	V
Van Ang	Phase A Voltage Angle	°
Vbn Ang	Phase B Voltage Angle	°
Vcn Ang	Phase C Voltage Angle	°
Vab Ang	Phase A to B Line-to-Line Voltage Angle	°
Vbc Ang	Phase B to C Line-to-Line Voltage Angle	°
Vca Ang	Phase C to A Line-to-Line Voltage Angle	°

3.2.2 Demand Screen and Operation

To view demand parameters:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Demand** and press **OK.**
3. Use the **Up** and **Down** keys to navigate between the demand screens
4. Press **Return** to move back one level.

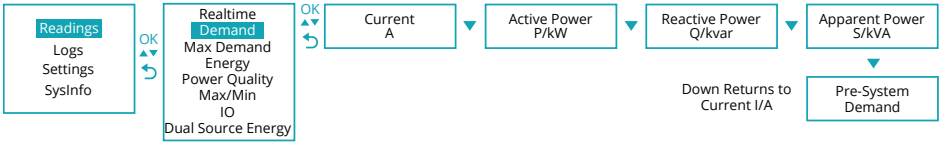


Figure 3-5 Demand Screen Flowchart

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Table 3-5 Demand Parameters Description

HMI Label	Parameter	Unit	Applicable Domain
I	Current Demand	A	A, B, C, N
P	Import Active Power Demand	kW	A, B, C, System
Q	Import Reactive Power Demand	kvar	A, B, C, System
S	Apparent Power Demand	kVA	A, B, C, System
Pre-P	Predicted Active Power Demand	kW	System
Pre-Q	Predicted Reactive Power Demand	kvar	System
Pre-S	Predicted Apparent Power Demand	kVA	System

3.2.3 Max Demand Screen and Operation

To view max demand parameters:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Max Demand** and press **OK.**
3. Use the **Up** and **Down** keys to navigate between the max demand screens. Each parameter has two dedicated screens, one for measured value followed by a date and time screen showing when the maximum value occurred.
4. Press **Return** to move back one level.

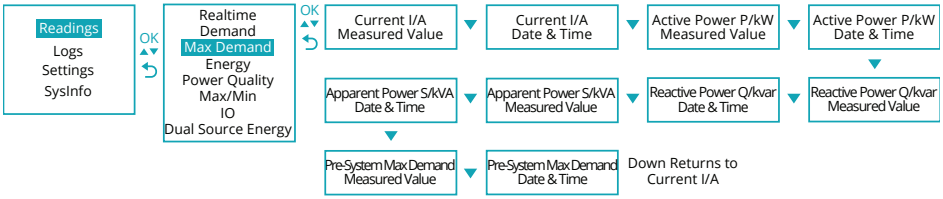


Figure 3-6 Max Demand Screen Flowchart

Table 3-6 Max Demand Parameters Description

HMI Label	Parameter	Unit	Applicable Domain
I	Maximum Current Demand	A	A, B, C, N
I Time Stamp	Date and Time of I	-	A, B, C, N
P	Maximum Active Power Demand	kW	A, B, C, System
P Time Stamp	Date and Time of P	-	A, B, C, System
Q	Maximum Reactive Power Demand	kVAR	A, B, C, System

HMI Label	Parameter	Unit	Applicable Domain
Q Time Stamp	Date and Time of Q	-	A, B, C, System
S	Maximum Apparent Power Demand	kVA	A, B, C, System
S Time Stamp	Date and Time of S	-	A, B, C, System
Pre-P, Pre-Q, Pre-S	Maximum Predicted System Demand	kW, kVAR, kVA	System
Pre Time Stamp	Date and Time of Pre-P, Pre-Q, Pre-S	-	System

3.2.4 Energy Screen and Operation

To view energy parameters:

1. From the main menu, select Readings and press **OK.**
2. Select Energy and press **OK.**
3. On the Energy menu, select either **Energy** or **Quadrant Energy** and press **OK.**
4. Use the **Up** and **Down** keys to navigate between screens. Energy has nine screens while Quadrant Energy has twelve.
5. Press **Return** to move back one level.

Energy values are accumulated and reported in double-precision format and are displayed in up to three decimals. The display resolution is fixed. Energy values on the display are updated once per second.

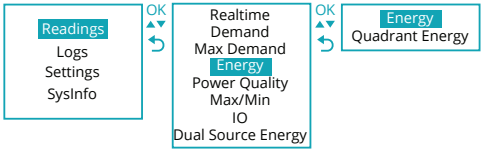


Figure 3-7 Energy Screen Flowchart

Energy Parameters

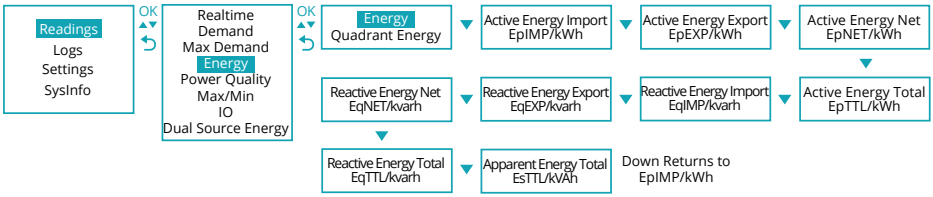


Figure 3-8 Energy Parameters Flowchart

Table 3-7 Energy Parameters Description

HMI Label	Parameter	Unit	Applicable Domain
EpIMP	Import Active Energy	kWh	A, B, C, System
EpEXP	Export Active Energy	kWh	A, B, C, System
EpNET	Net Active Energy	kWh	A, B, C, System
EpTTL	Total Active Energy	kWh	A, B, C, System
EqIMP	Import Reactive Energy	kvarh	A, B, C, System
EqEXP	Export Reactive Energy	kvarh	A, B, C, System
EqNET	Net Reactive Energy	kvarh	A, B, C, System
EqTTL	Total Reactive Energy	kvarh	A, B, C, System
EsTTL	Total Apparent Energy	kVAh	A, B, C, System

Quadrant Energy Parameters

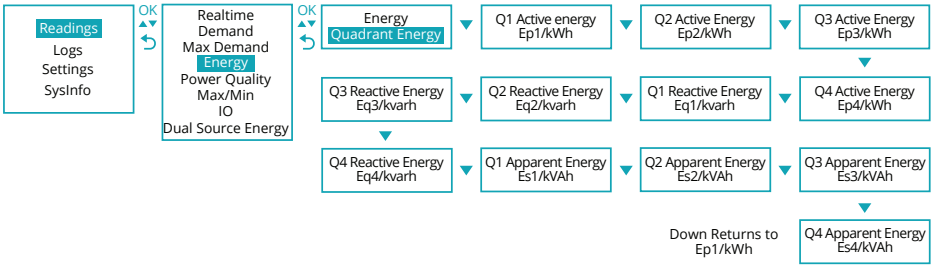


Figure 3-9 Quadrant Energy Parameters Flowchart

Table 3-8 Quadrant Energy Parameters Description

HMI Label	Parameter	Unit	Applicable Domain
Ep1	Quadrant 1 Active Energy	kWh	A, B, C, System
Ep2	Quadrant 2 Active Energy	kWh	A, B, C, System
Ep3	Quadrant 3 Active Energy	kWh	A, B, C, System
Ep4	Quadrant 4 Active Energy	kWh	A, B, C, System
Eq1	Quadrant 1 Reactive Energy	kvarh	A, B, C, System
Eq2	Quadrant 2 Reactive Energy	kvarh	A, B, C, System
Eq3	Quadrant 3 Reactive Energy	kvarh	A, B, C, System
Eq4	Quadrant 4 Reactive Energy	kvarh	A, B, C, System
Es1	Quadrant 1 Apparent Energy	kVAh	A, B, C, System
Es2	Quadrant 2 Apparent Energy	kVAh	A, B, C, System
Es3	Quadrant 3 Apparent Energy	kVAh	A, B, C, System
Es4	Quadrant 4 Apparent Energy	kVAh	A, B, C, System

3.2.5 Power Quality Screen and Operation

To view power quality parameters:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Power Quality** and press **OK.**
3. Select either **Unbalance V** or **Unbalance I** and press **OK.**
4. Press **Return** to move back one level.

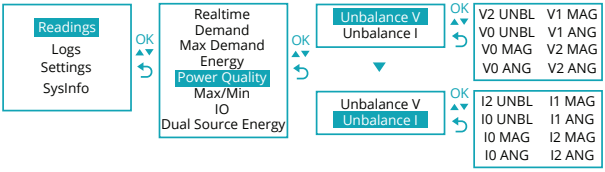


Figure 3-10 Power Quality Parameters Flowchart

Table 3-9 Voltage Unbalance Parameters Description

HMI Label	Parameter	Unit
V2 UNBL	Negative-Sequence Voltage Unbalance	%
V0 UNBL	Zero-Sequence Voltage Unbalance	%
V0 MAG	Zero-Sequence Voltage Magnitude	V
V0 ANG	Zero-Sequence Voltage Angle	°
V1 MAG	Positive-Sequence Voltage Magnitude	V
V1 ANG	Positive-Sequence Voltage Angle	°
V2 MAG	Negative-Sequence Voltage Magnitude	V
V2 ANG	Negative-Sequence Voltage Angle	°

Table 3-10 Current Unbalance Parameters Description

HMI Label	Parameter	Unit
I2 UNBL	Negative-Sequence Current Unbalance	%
I0 UNBL	Zero-Sequence Current Unbalance	%
I0 MAG	Zero-Sequence Current Magnitude	A
I0 ANG	Zero-Sequence Current Angle	°
I1 MAG	Positive-Sequence Current Magnitude	A
I1 ANG	Positive-Sequence Current Angle	°
I2 MAG	Negative-Sequence Current Magnitude	A
I2 ANG	Negative-Sequence Current Angle	°

3.2.6 Max / Min Screen and Operation

To view max / min parameters:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Max / Min** and press **OK.**
3. Use the **Up** and **Down** keys to navigate options.
4. Press **Return** to move back one level.

The following flow chart indicates the available max/min values. Each parameter has a defined page with two dedicated screens, one for measured value followed by the timestamp of the recorded value.

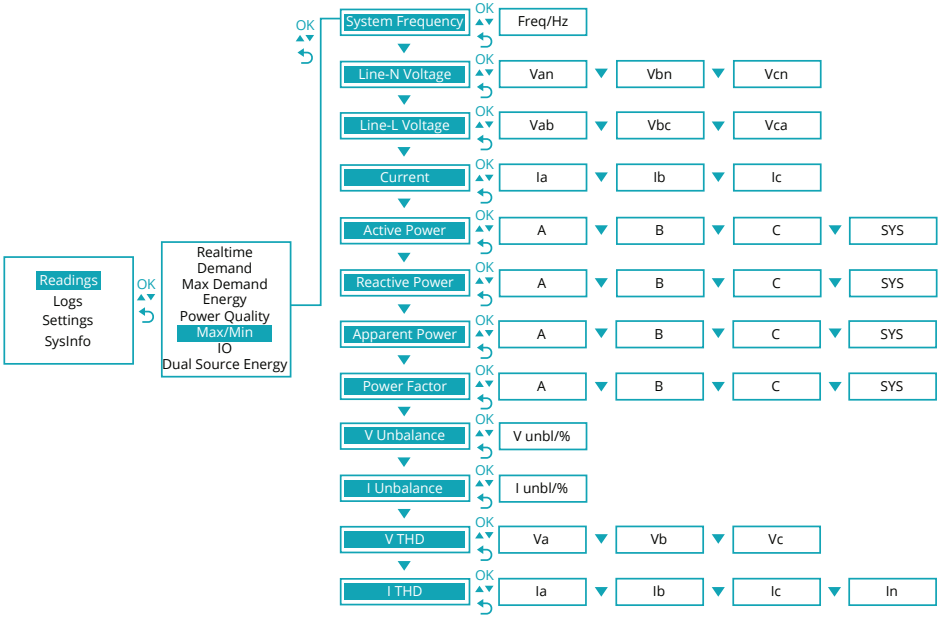


Figure 3-11 Max / Min Parameters Flowchart

Table 3-11 Max / Min Parameters Description

Page	Dedicated Screen HMI Label	Unit	Applicable Domain
System Frequency	Freq	Hz	System
Line-N Voltage	Van, Vbn, Vcn	V	A, B, C
Line-L Voltage	Vab, Vbc, Vca	V	Phase A to B, Phase B to C, Phase C to A
Current	Ia, Ib, Ic	A	A, B, C

Page	Dedicated Screen HMI Label	Unit	Applicable Domain
Active Power	P	kW	A, B, C, System
Reactive Power	Q	kvar	A, B, C, System
Apparent Power	S	kVA	A, B, C, System
Power Factor	PF	—	A, B, C, System
V Unbalance	V unbl	%	System
I Unbalance	I unbl	%	System
V THD	Va, Vb, Vc	%	A, B, C
I THD	Ia, Ib, Ic, In	%	A, B, C, N

3.2.7 I/O Screen and Operations

To view the parameters and status of I/O:

1. From the main menu, select **Readings** and press **OK.**
2. Select **IO** and press **OK.**
3. Use the **Up** and **Down** keys to navigate between the digital input pulse count screen and status, and digital output status screen.
4. Press **Return** to move back one level.

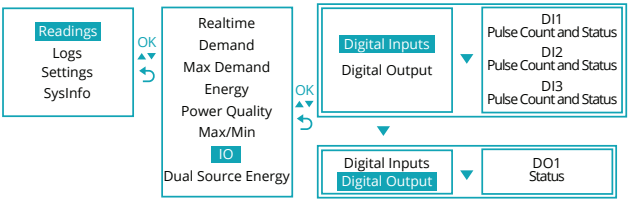


Figure 3-12 I/O Parameters Flowchart

Table 3-12 I/O Parameters Description

Screen	HMI label	Parameter	Data Format
Digital Inputs	DI1	Pulse Count and Input Status	Count / On, Off
	DI2	Pulse Count and Input Status	Count / On, Off
	DI3	Pulse Count and Input Status	Count / On, Off
Digital Output	DO1	Output Status	On, Off

3.2.8 Dual Source Energy

To view dual source energy values:

1. From the main menu, select **Readings** and press **OK.**
2. Select **Dual Source Energy** and press **OK.**
3. A single screen displays accumulated energy for both sources.
4. Press **Return** to move back one level.



Figure 3-13 Dual Source Energy Flowchart

Table 3-13 Dual Source Energy Parameter Description

HMI Label	Parameter	Applicable Domain
E1 (Grid)	Accumulated Channel 1 Grid Energy	User-assigned
E1 (Gen)	Accumulated Channel 1 Generation Energy	User-assigned
E2 (Grid)	Accumulated Channel 2 Grid Energy	User-assigned
E2 (Gen)	Accumulated Channel 2 Generation Energy	User-assigned
E3 (Grid)	Accumulated Channel 3 Grid Energy	User-assigned
E3 (Gen)	Accumulated Channel 3 Generation Energy	User-assigned

E1, E2, and E3 are user-assignable energy channels. Based on the active source, each channel accumulates two independent registers, one for grid and other for generation energy. Refer Section 3.4 Settings > Dual Source Energy to assign each channel. See Table 3-14 for the available selections.

INFO

Dual source energy is accumulated at a resolution of 0.1 kWh. The energy values in Section 3.2.4 Readings > Energy uses a resolution of 0.001 kWh, so the grid and generation values displayed will not sum exactly to the total on the other screen.

Table 3-14 Dual Source Energy Channel Assignments

Selection	Scope	Unit
Not Selected	-	Channel disabled
Active Energy	System	kWh
Phase A Active Energy	A	kWh
Phase B Active Energy	B	kWh
Phase C Active Energy	C	kWh
Reactive Energy	System	kvarh
Phase A Reactive Energy	A	kvarh
Phase B Reactive Energy	B	kvarh
Phase C Reactive Energy	C	kvarh
Apparent Energy	System	kVAh
Phase A Apparent Energy	A	kVAh
Phase B Apparent Energy	B	kVAh
Phase C Apparent Energy	C	kVAh

3.3 Logs Menu

To view logs:

1. From the main menu, select **Logs** and press **OK.**
2. Use the **Up** and **Down** keys to navigate the available logs.
3. Select the log to view and press **OK.**
4. Press **Return** to move back one level.

Table 3-15 Log Type and Description

Log Type	Description	Availability
Check PQ Event Log	Power Quality Events including Sags, Swells, and Interruptions, with Associated Waveform Records	Acurev-1322 Only
Check Alarm Log	Alarm Conditions Triggered by the Configured Alarm Groups, With Timestamps	All Models
Check SOE Log	Sequence Of Events Records from the Digital Inputs, With Timestamps	All Models
Check System Log	Device Events such as Power Up, Power Down, Reset, and Firmware Update	All Models

INFO The Audit Log is not viewable from the display. On MID-certified models it can be read using Acuview2, refer Section 5.5.12.1 for further details.

3.4 Settings Menu

To view and change settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.** The default password is **0000.**
3. Use the **Up** and **Down** keys to navigate between the available menus, then press **OK** to enter.
4. Edit the settings as described in **Editing a setting.**
5. Press **Return** to move back one level.

Editing a setting

All settings screens use the same editing scheme. The selected list or numeric field will flash.

1. Press **OK** to begin editing. The first field will start flashing.
2. For a list field, press **Up** to cycle through the available options.
3. For a numeric field, press **Up** to increment the blinking digit, then **Down** to move to the next digit.
4. Press **Down** from the last digit of a field to move to the next field.

Press **OK** to save or **Return** to discard the changes.

3.4.1 Basic Settings

To configure the basic settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Basic** and press **OK.**
4. Use the **Up** and **Down** keys to move between settings. See **Editing a setting** for the editing procedure.
5. Press **Return** to move back one level.

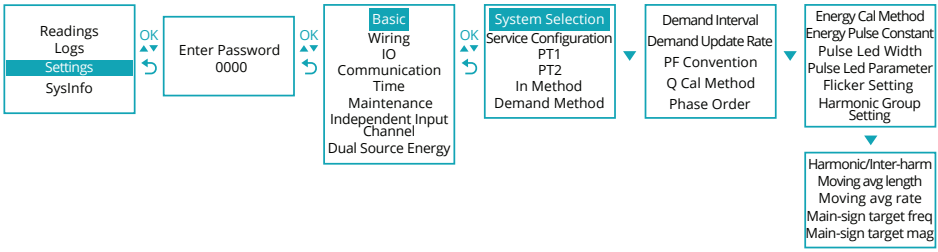


Figure 3-14 Basic Settings Flowchart

Table 3-16 Basic Settings Menu Structure

Menu	Setting	Available Selections
Basic	System Selection	Frequency Options: 50 / 60 Hz
	Service Configuration	3 Element 4 Wire Wye 2 Element 3 Wire Network 2 Element 3 Wire Delta 2 Element 3 Wire 1 Phase 1 Element 2 Wire 3 Element 4 Wire Delta
	PT1	Range: 50-1,000,000 Default: 480
	PT2	Range: 50-830 Default: 480
	In Method	Measured Calculated
	Demand Method	Sliding Fixed
	Demand Interval	Range: 1-30 Default: 15 min
	Demand Update Rate	Range: 1-30 Default: 1 min
	PF Convention	IEC IEEE
	Q Cal Method	Generic Reactive Power True Reactive Power
	Phase Order	ABC ACB

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Menu	Setting	Available Selections
Basic	Energy Cal Method	Fundamental Generic
	Energy Pulse Constant	Range: 0.100-100000.000 Default: 1000 imp/kWh
	Pulse LED Width	Range: 20-100 Default: 100 ms
	Pulse LED Parameter	Range: 0-54
	Flicker Settings (AcuRev-1322 only)	Disable 230V-60Hz-60W 120V-60Hz-60W 230V-50Hz-60W 120V-50Hz-60W Automatic
	Harmonic Group Settings	Harmonic Group Harmonic Subgroup
	Harmonic/Inter-harmonic	Harmonic Harmonic & Inter-harmonic
	Moving Average Length	Range:1-20 Default: 1 Cycle
	Moving Average Rate	Range: 1-12 Default: 1 Cycle
	Mains-Signalling Target Frequency	Range: 1-500 Default: 50 Hz
	Mains-Signalling Target Magnitude	Range: 1-300 Default: 120 V

3.4.2 Wiring Settings:

To configure the wiring settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Wiring** and press **OK.**
4. Navigate between the four current input channels by pressing **Up / Down** keys and press **OK** to select an input channel to configure.
5. Set the current direction, secondary output type, and CT primary rating for the channel. See

Editing a setting in section 3.4 for the editing procedure.

6. Press **Return** to move back one level.

> **INFO** The current input type is fixed by model. Depending on the model ordered, the meter accepts 80 mA, 100 mA, 333 mV, or Rogowski coil current transformers (RCT).
>
> Confirm the input type on the meter label before selecting CT type.

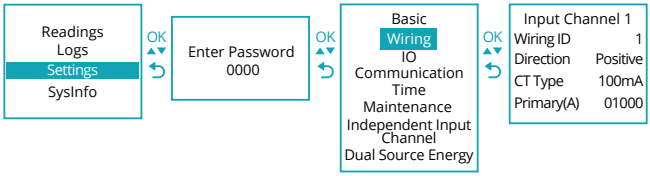


Figure 3-15 Wiring Screen Flowchart

Table 3-17 Wiring Settings Structure

Menu	Setting	Available Selections
Wiring	Input Channel 1	Wiring ID: 1-4 Direction: Positive or Negative CT Type: 80mA, 100mA, 333mV, or RCT Primary (A): 1-50000

> **INFO** The setting and available selections for Input Channel 1 are similar and applies to Input Channels 2 – 4.

3.4.3 I/O Settings

To configure the I/O settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **IO** and press **OK.**
4. Select either **DO Settings** or **DI Settings** and press **OK.** In DI Settings, Use the **Up** and **Down** keys to navigate between DI1 to DI3.
5. Press **Return** to move back one level.

Digital output settings

Table 3-18 DO Screen Description

Field	Description
Type	Energy Pulse Output, Alarm Indication, or Manual Control
Pulse Width (ms)	Output Pulse Duration
Parameter	ID Assigned to the Pulse Output

Digital input settings

Table 3-19 DI Screen Description

Field	Description
Type	Status Monitor or Pulse Counter
Pulse Constant	Pulses per Unit for Connected Device

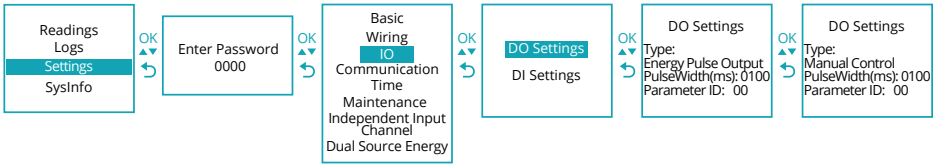


Figure 3-16 I/O Screen Flowchart

Table 3-20 I/O Settings Structure

Menu	Setting	Field	Options
IO	DO Settings	Type	Energy Pulse Output Alarm Indication Manual Control
		Pulse Width (ms)	Range: 20-3000 Default: 100 ms
		Parameter ID	Range: 0-54
	DI Settings	Type	Status Monitor Pulse Counter
		Pulse Constant	Range: 0.1-100000 Default 1

3.4.4 Communication Settings

To configure the communication settings

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Communication** and press **OK.**
4. Use the **Up** and **Down** keys to move between settings. See **Editing a setting** in section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

Table 3-21 Communication Settings Structure

Menu	Setting	Options / Range
Communication	Serial Port	Baud Rate • 9600 • 19200 (Default) • 38400 • 57600 • 76800 • 115200 Parity • Even • Odd • None2 • None1 (Default)
	Ethernet Mode	RSTP Enable Single ETH (No RSTP) Dual ETH (No RSTP)
	DHCP Enable	Enable Disable
	IP	Default: 192.168.1.254
	Subnet	Default: 255.255.255.000
	Gateway	Default: 192.168.1.1
	DNS1	Default: 008.008.008.008
	DNS2	Default: 008.008.004.004
	Modbus Slave ID	Range: 1-247 Default: 1

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Menu	Setting	Options / Range
Communication	RS485 Protocol	Disable Modbus RTU BACnet MS/TP
	Modbus TCP Enable	Enable Disable
	Modbus TCP Port	Range: 1-65534 Default: 502
	BACnet MS/TP Address	Range: 0-127 Default: 1
	BACnet MS/TP Frames	Range: 1-255 Default: 255
	BACnet MS/TP ID	Range: 0-4194302 Default: 1
	Webpage Enable	Enable Disable
	Restore Web Password	Yes No

INFO Restore Web Password returns the web interface password to its factory default as seen in Section 4.1. Anyone currently logged in to the web interface is signed out. Webpage Enable is protected by the Protocol Setting non-standard seal.

3.4.5 Date & Time Settings

To set the date and time:

1. From the main menu, select Settings and press **OK.**
2. Enter the password and press **OK.**
3. Select Date & Time and press **OK.**
4. Set the date and time. See **Editing a setting** in section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

INFO The meter time stamps all logs, alarms, and max / min records. Set the correct date and time during commissioning, before placing the meter in service.

3.4.6 Maintenance Settings

WARNING

The maintenance menu contains operations that can permanently erase stored data. Cleared energy, demand, and log records cannot be recovered. On a meter used for billing, record all values before performing any clear or reset operation.

To use the maintenance settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Maintenance** and press **OK.**
4. Use the **Up** and **Down** keys to move between operations and press **OK** to select one.
5. Press **Return** to move back one level.

Table 3-22 Maintenance Settings Structure

Menu	Settings	Options / Range
Maintenance	Clear Energy	Yes or No
	Clear Max Demand	Set Clear Mode • Disable • Automatic • Manual Manual Clear MaxDemand: Yes or No Set Auto Clear Date Check Clear Record • Total Clear Count • Last Clear Time Reset Clear Record • Yes • No
	Clear MaxMin	Yes or No
	Clear Device Run Time	Yes or No
	Clear Load Time	Yes or No
	Clear SOE Log	Yes or No

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Menu	Settings	Options / Range
Maintenance	Clear Alarm Log	Yes or No
	Clear PQ Event Log (AcuRev-1322 Only)	Yes or No
	Reset Factory	Yes or No
	Reset Network	Yes or No
	Configure Password	Default: 0000
	Set LCD Backlight Time	Range: 0-120 Default: 1 min
	Clear DataLog1	Yes or No
	Clear DataLog2	Yes or No
	Clear DataLog3	Yes or No
	Clear TrendLog	Yes or No
	Clear DI Counter	Yes or No
	Set Non-Standard Seal	Set RS485 • Unseal or Seal Set Ethernet • Unseal or Seal Set Comm Protocol • Unseal or Seal Set Clear Loadtime • Unseal or Seal Set Clear Runtime • Unseal or Seal
	Clear Dual Energy	Yes or No
	Clear Dual Record	Yes or No
	Clear System Log	Yes or No
	Clear Audit Log	Yes or No
	Clear AcuCloud Log	Yes or No

INFO The display password protects the **Settings** Menu on the meter display only. The web interface uses a separate password as seen in Chapter 4.

3.4.7 Independent Input Channel Settings

To configure the independent input channels:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Independent Input Channel** and press **OK.**
4. Use the **Up** and **Down** keys to navigate between settings. See **Editing a setting** in section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

Table 3-23 Independent Channel Settings

Setting	Description
Enable Independent Channel	Enables Independent Channel Mode
Channel Voltage Select	Assigns Voltage Input to Each Current Channel
Sum1 Config	Selects Channels to Aggregate into Group 1
Sum2 Config	Selects Channels to Aggregate into Group 2

Table 3-24 Independent Input Channel Structure

Menu	Settings	Options/Range
Independent Input Channel	Enable Independent Channel	Enable / Disable
	Channel Voltage Select	I1 / I2 / I3 / I4 • Va • Vb • Vc • Vab • Vbc • Vca • Disable
	Sum1 Config	I1 / I2 / I3 / I4 • Selected • Unselected
	Sum 2 Config	I1 / I2 / I3 / I4 • Selected • Unselected

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3.4.8 Dual Source Energy Settings

To configure the dual source energy settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **Dual Source Energy** and press **OK.**
4. Use the **Up** and **Down** keys to navigate between settings. See Editing a setting in Section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

Table 3-25 Dual Source Settings

Setting	Description
Enable Dual Energy	Enable Dual Source Energy Accumulation
Energy Select	Assign Energy Parameter to E1, E2, and E3 See Table 3-14 for available selections
Control Mode	Determine and Select Active Source via Communications, or Digital Input DI1 - DI3
Direction Flag	Sets Active State Source as Grid or Generation

Table 3-26 Dual Source Energy Settings Structure

Menu	Settings	Options/Range
Dual Source Energy	Enable Dual Energy	Enable / Disable
	Energy Select	E1 E2 E3
	Control Mode	Communication • DI1 • DI2 • DI3
	Direction Flag	Grid Direction Generator Direction

3.4.9 BACnet/IP Settings

To configure the BACnet/IP settings

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **BACnet IP** and press **OK.**
4. Use the **Up** and **Down** keys to move between settings. See Editing a setting in Section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

Table 3-27 BACnet/IP Settings

Setting	Description
BACnet IP Enable	Enables BACnet/IP Communication
UDP Port	Listening UDP Port for the Meter
Network Number	Assigned BACnet Network Number
Device Instance	Unique Device Instance Identifier on BACnet Network
Advanced APDU Timeout	Time Before Unacknowledged Request is Retried
Advanced APDU Retries	Number Of Retry Attempts Before Request Fails
Foreign Device Enable	Registers Meter as a Foreign Device with Broadcast Management Device (BBMD) on another Subnet
Foreign Device IP	IP Address of BBMD
Foreign Device UDP Port	UDP Port of BBMD
Foreign Device Reg TTL	Registration Lifetime Before Meter Re-Registers with BBMD

Table 3-28 BACnet/IP Settings Structure

Menu	Settings	Options/Range
BACnet IP	BACnet IP Enable	Enable/Disable
	UDP Port	Range: 1-65535
	Network Number	Range: 0-65534
	Device Instance	Range: 0-4194302
	Advanced APDU Timeout	Range: 100-65535
	Advanced APDU Retries	Range: 0-255
	Foreign Device Enable Foreign Device IP	Enable/Disable
	Foreign Device IP	IP Address
	Foreign Device UDP Port	Range: 0-65535
	Foreign Device Reg TTL	Range: 0-65535

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3.4.10 SNTP Settings:

To configure the SNTP settings:

1. From the main menu, select **Settings** and press **OK.**
2. Enter the password and press **OK.**
3. Select **SNTP** and press **OK.**
4. Use the **Up** and **Down** keys to navigate between settings. See Editing a setting in Section 3.4 for the editing procedure.
5. Press **Return** to move back one level.

Table 3-29 SNTP Settings

Settings	Description
SNTP Enable	Enables Automatic Time Synchronization with an SNTP Server
SNTP Update Interval	Time Frequency for Meter Clock Synchronization with the Server

INFO When SNTP is enabled, the meter clock is set automatically and any time entered manually under Settings > Date & Time is overwritten at the next synchronization.

3.5 SysInfo

To view system information:

1. From the main menu, select **SysInfo** and press **OK.**
2. Use the **Up** and **Down** keys to navigate between options, then press **OK** to view the information.
3. Press **Return** to move back one level.

The following information is available:

- **Manufacturer**
- **Product Model**
- **Serial Number**
- **Hardware Version**
- **Boot Version**
  - **BOOT CRC (-MD Models Only)** - CRC-32 of the boot firmware image.
- **Firmware Version**

  - **APP CRC (-MD Models Only)** - CRC-32 of the application firmware image.
- **Seal Status**
- **MAC Address**
- **Date & Time**
- **Run Time** – The total time the meter has been powered.
- **Load Time** – The total time that a load has been present.

3.6 Fatal Error

This is only applicable for MD models of AcuRev 1320 Series. MID-certified models verify the integrity of firmware, factory data, calibration values, metering configuration, and stored energy at every startup, and monitor the RTC, ADC, SDRAM, Flash, and FRAM during operation. A Fatal Error is raised when any of the following is detected:

Table 3-30 Fatal Error Trigger Conditions

Event	Object Checked	Detected
Firmware CRC Failure	Application and Boot Firmware Images	At Startup
Production Information CRC Failure	Serial Number, Hardware Version, MAC Addresses, and Other Factory Data	At Startup
Calibration Value CRC Failure	Per-channel Voltage and Current Gain and Phase-Angle Coefficients	At Startup
Metering Configuration CRC Failure	Metrology Settings and Dual Source Energy Settings	At Startup
Energy Value CRC Failure	Stored Energy Registers	At Startup
Hardware Fault	RTC, ADC, SDRAM, Flash, FRAM	During Operation
Audit Log Full	5000 Entries of Audit Log Storage	On Log Write

When a Fatal Error occurs, the meter stops accumulating energy, writes the event to the Audit Log, sets the corresponding bit in the system status registers, and displays the **Fatal error!** screen.



Figure 3-17 Fatal Error Screen

Pressing **Return** closes the screen and returns to the previous view and the screen reappears after 10 seconds while the condition persists. The specific error can be identified by reading the system status registers over Modbus as mentioned in Section 6.3.4 or from the Audit Log in Acuview2 of Section 5.5.12.1.

INFO Non-MID models do not display a Fatal Error and do not stop energy accumulation. CRC checks are still performed and their results recorded.

A Fatal Error indicates the meter's measurement data can no longer be relied on for billing. Record the readings, note the error, and contact Mod-Tronic technical support.

3.7 Configuration Mode Prompt

This is only applicable for CTEP certified models, AcuRev-1321-mV-CP and AcuRev-1322-mV-CP. The display shows a configuration mode prompt whenever the seal button is in the **Unsealed** state. The prompt overlays the normal display.

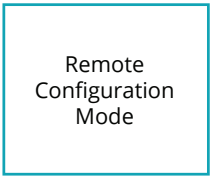


Figure 3-18 Configuration Mode Prompt

The prompt cannot be dismissed from the keypad. It clears automatically when the seal button is returned to the **Sealed** state, at which point the display resumes normal operation.

This will not affect other models in the AcuRev 1320 series, the display continues to operate normally while unsealed.

Chapter 4: Web Interface

4.1 Accessing the Web Interface

The AcuRev 1320 includes a built-in web server that provides full access to readings, logs, and configuration from any browser, with no software installation required.

For access, enter the meter's IP address in the address bar of a web browser. The IP address can be viewed on the display at **Settings → Communication → IP.** Entering the Settings menu requires the display password, which is **0000** by default.

The browser opens a login page.

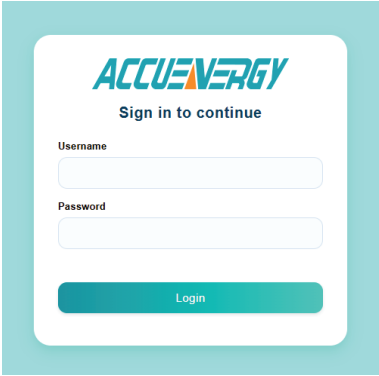


Figure 4-1 Web Interface Login

Table 4-1 Credentials for Login

Field	Default
Username	admin
Password	Admin@ Followed by the Last Six Digits Of the Meter's Serial Number

For Example: Meter with serial number 12345678 has the default password Admin@345678. The serial number is printed on the meter label and can be viewed on the display at **SysInfo → Serial Number.**

INFO

Change the default password during commissioning. The web interface provides full configuration access to the meter, including energy and log clearing operations.

If the browser cannot reach the meter, check that web access is enabled at Settings → Communication → Webpage Enable on the display.

Users logging in will be directed to the AcuRev 1320 Realtime webpage by default.

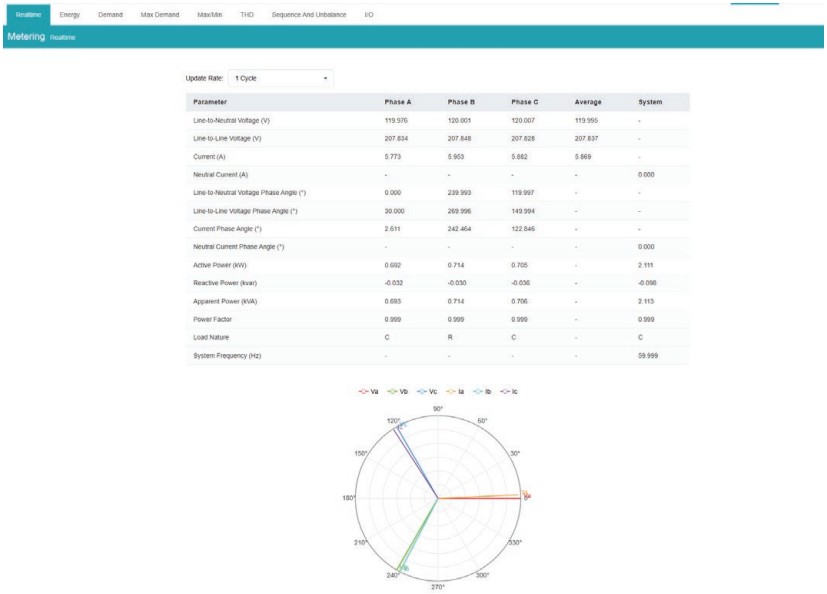


Figure 4-2 Default Metering Page

The AcuRev 1320 webpage main menu is structured into About, Settings, and AcuRev 1320 sections.

For a detailed breakdown of the webpage's hierarchical structure, refer to Table 4-2.

Table 4-2 AcuRev 1320 Webpages Hierarchical Structure

Section	Page	Tab
About	Device Information	-
Settings	Metering	General
		Current & Wiring
		Demand
		Power Quality
	Communication	-
	I/O	-
	Time & Date	Time & Timezone
		DST
	Management	-
	Certificate Management	-
	Alarm	-
	Dual Source Energy	-
	PQ Event & Waveform (AcuRev-1322 Only)	-
	Data Log	Data Log 1
		Data Log 2
		Data Log 3
		Trend Log
	Data Post	-
	AcuCloud	-
AcuRev 1320	Realtime	-
	Energy	-
	Demand	-
	Max Demand	-
	Max/Min	-
	THD	-
	Sequence and Unbalance	-
	I/O	-

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4.2 Changing Web Password

To change the web password:

1. Go to **Settings** → **Communication** and **Click** Modify Password.
2. **Enter** the new password in **New Password** column, then re-enter it in **Confirm New Password.**
3. **Click** Save.

The password must be 6 to 16 characters long. All printable ASCII character except space is supported which includes uppercase letters (A – Z), lowercase letters (a – z), digits (0 – 9), and special characters such as ! ,@, #, $, %.

When the change succeeds, a confirmation dialog appears and the current session is ended. Click **OK** to return to the login page and log in with the new password.

4.3 Forgotten Password

The web password cannot be recovered or reset from the web interface. If forgotten, **Click** Forgot Password on the **Login** page. A prompt will appear explaining how to reset the password.

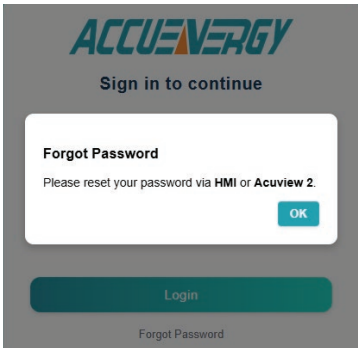


Figure 4-3 Forgotten Password Prompt

Reset the password to its factory default using one of the following methods:

- For meter display, follow S**ettings → Communication → Restore Web Password.**
- In Acuview 2, view **Setting → Communication → Reset to Default Password** or view Section 5.4.2.

> **INFO** Changing or resetting the web password from the display or from Acuview 2 will sign out everyone logged in to the web interface. The next action by user in the browser returns user to the **Login** page.

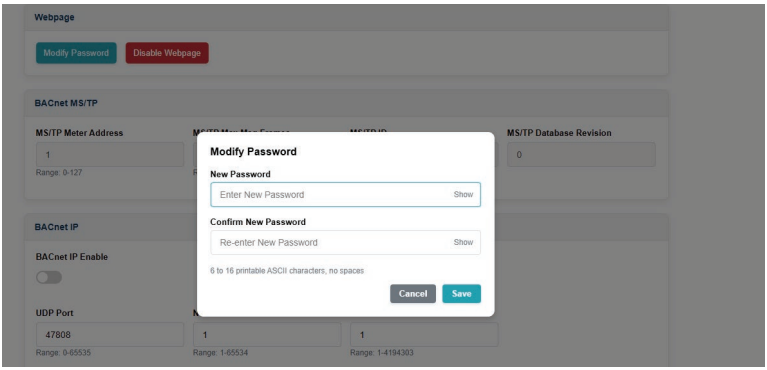


Figure 4-4 Modify Password Dialog

4.4 Enabling and Disabling Web Access

Web access is enabled by default. When it is disabled, the meter does not respond to any web request, and browsers cannot open its pages. Disabling web access is recommended on meters where the web interface is not used.

To disable web access from the web interface:

1. Go to **Settings → Communication** and **Click** Disable Webpage.
2. Confirm when prompted and the session will end immediately.

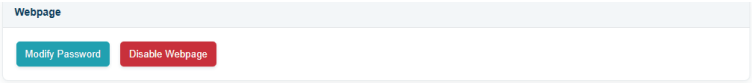


Figure 4-5 Disable Webpage Button



Figure 4-6 Disable Webpage Confirmation

When web access is disabled, it can only be re-enabled from the meter display from **Settings → Communication → Webpage Enable** or from Acuview 2 in **Setting → Communication → Webpage Enable.**

Webpage Enable is protected by the Protocol Setting non-standard seal.

Chapter 5: Accessing AcuRev 1320 using Acuview 2 Software

5.1 Introduction

Acuview 2 is configuration and monitoring software for the AcuRev 1320 provided by Accuenergy. It provides a single interface for reading measurements, configuring settings, logging data, and updating firmware.

This chapter describes steps to connect the meter to Acuview 2 and to use the software's main functions. Acuview 2 can be downloaded free of charge from Mod-Tronic website.

5.2 Connecting to AcuRev 1320

AcuRev 1320 can be connected to Acuview 2 over RS485 or Ethernet.

RS485 Connection

An RS485-to-USB converter is required to connect the RS485 port of AcuRev 1320 to a computer. Wire the converter to the meter as follows:

- T/R+ connects to A+
- T/R- connects to B-
- GND connects to S

Ethernet connection

The meter can be connected over a local network using its Ethernet interface. The IP address can be viewed on the display at **Settings → Communication → IP.** Entering the Settings menu requires the password, which is **0000** by default.

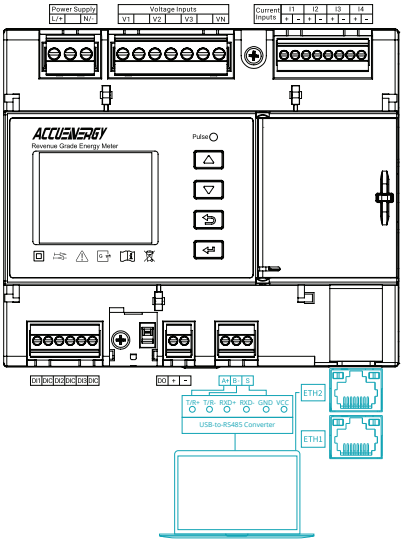


Figure 5-1 Meter Communication Port Connection

5.2.1 Adding a meter

1. Open Acuview 2 and click the + button beside **Click To Add New Meter.**



Figure 5-2 Adding a New Meter

2. On the new page, click ⊕, enter a name for the meter and select **AcuRev 1320** as the model.

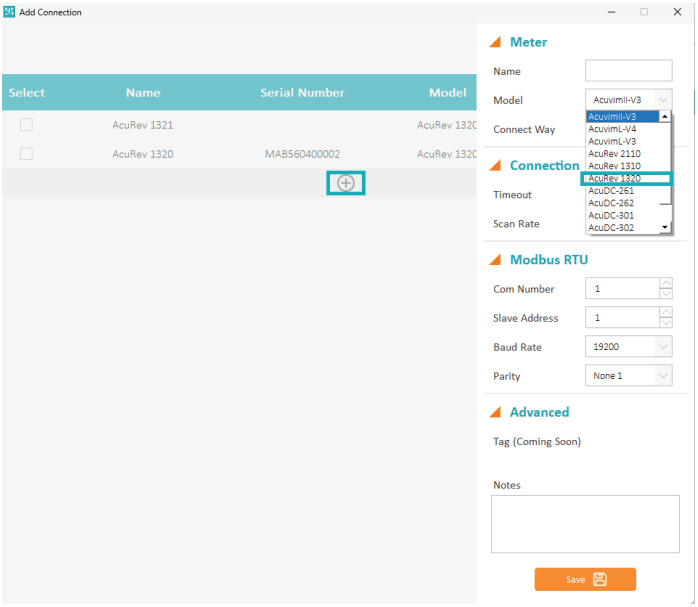


Figure 5-3 Selecting the Meter Model

3. Select the connection method as **Modbus RTU** or **Modbus TCP,** and configure the settings. Default configuration is as below. The COM port can be confirmed in **Device Manager** on the computer.

Table 5-1 Modbus RTU Default Settings

Setting	Default
Com Number	1
Slave Address	1
Baud Rate	19200
Parity	None1

Table 5-2 Modbus TCP Default Settings

Setting	Default
IP Address	127.000.000.001
Slave Address	1
Port Number	502

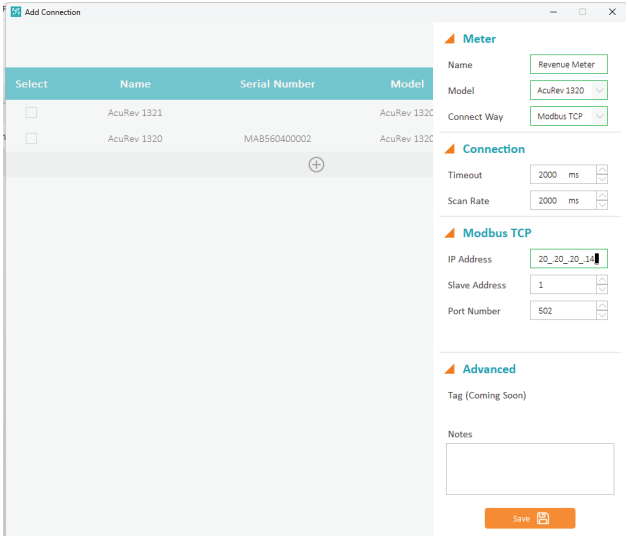


Figure 5-4 Modbus TCP Connection Settings

4. Click **Save.**
5. Select the meter from the device list and click **Connect.**

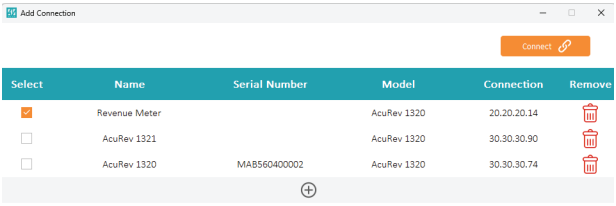


Figure 5-5 Selecting a Meter to Connect

5.3 Acuview 2 Interface

Once connected, the main interface opens. It has four areas:

Table 5-3 Interface Description

Number	Option	Description
1	Menu Bar	Access to Connection, Setting, Operation, and Help menus.
2	Window Title	Displays the name, serial number, and model of each connected meter. Click a tab to switch between meters.
3	Explore Panel	Navigates the meter's functions, divided into Reading and Setting. Reading values are refreshed automatically at the configured scan rate.
4	Data Panel	Displays readings and settings for the selected function. The bar at the top shows the current path within the meter, along with any available actions such as **Save To File.**

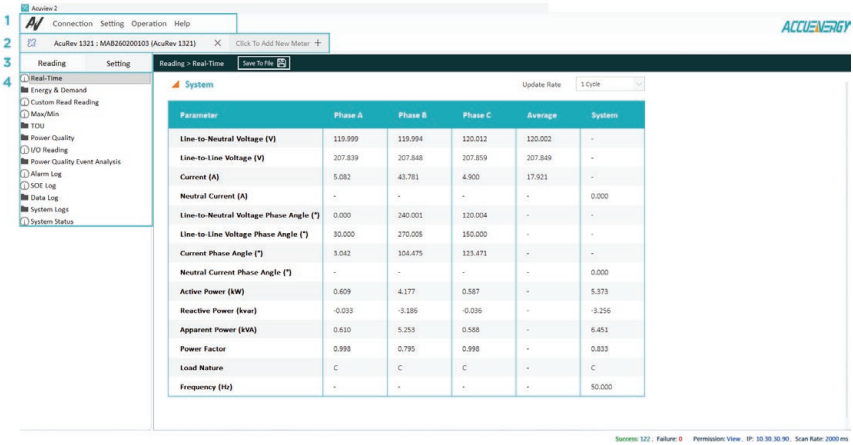


Figure 5-6 Acuview 2 Main Interface

Table 5-4 Connection Menu

Icon	Command	Description
	Connect	Connects the device, enables data reading, and allows write commands.
	Disconnect	Disconnects the device, stops data reading, and blocks write commands.
	Add Connection	Adds and connects a new device.
	Remove Connection	Disconnects and removes the active connection.

Table 5-5 Setting Menu

Icon	Command	Description
	General Setting	Views and sets the application's general settings.
	Data Log Setting	Views and sets the data log settings for each connected meter.
	Clear Cache	Clears the Acuview 2 cache.

Table 5-6 Operation Menu

Icon	Command	Description
	Export Configuration	Saves the active meter's configuration to a file.
	Import Configuration	Imports settings to the active meter from a configuration file.
	Firmware Update	Updates the Firmware of Available Meters
	Find Device	Search Available Meters on the Local Network
	Calculate Pulse Constant	Calculate Pulse Constant Parameters
	Start Data Logging	Start Data Logging Once Data Log Settings are Complete.
	Stop Data Logging	Stops Data Logging

Table 5-7 Help Menu

Icon	Command	Description
	User Manual	Opens the Acuview 2 User Manual
	About	Displays Software Information

5.4 Setting

Acuview 2 provides access to the entire AcuRev 1320 configuration, including metering and wiring parameters, communications, demand calculation, I/O, alarms, time-of-use billing, data logging, and the device password. All the Settings are grouped in the **Setting** tab of the explore panel, and each page corresponds to a section of the meter's configuration.

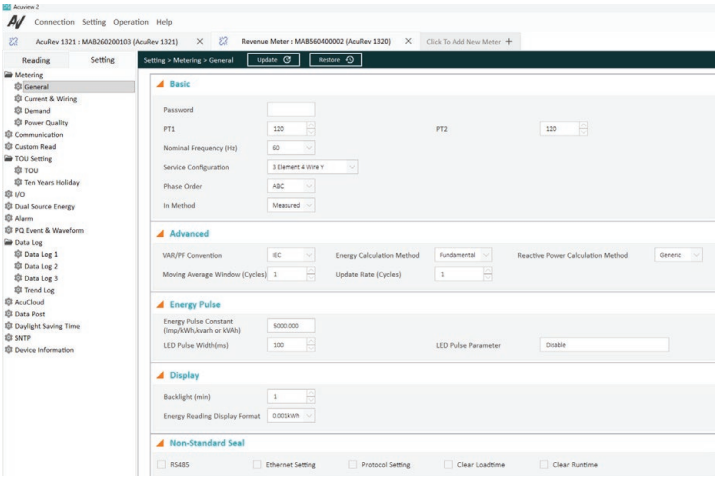


Figure 5-7 General Settings UI

5.4.1 Metering

5.4.1.1 General

To open the page, click the **Setting** tab in the explore panel and select **Metering > General.** After changing any setting, click **Update** at the top of the page and **Confirm** when prompted. Click **Restore** to discard unsaved changes.

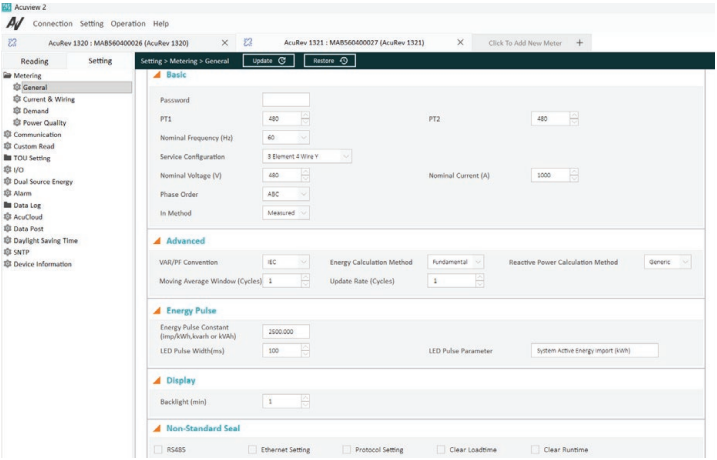


Figure 5-8 General Settings Page

Basic

Table 5-8 Basic Settings Description

Setting	Description	Range / Options	Default
Password	Meter Password	0000 - 9999	0000
PT1	PT Primary Voltage	50 - 1, 000,000 V	480
PT2	PT Secondary Voltage	50–830 V	480
Nominal Frequency	System Frequency	50 Hz, 60 Hz	60 Hz
Service Configuration	Wiring Configuration for the Service being metered	See List Below	3 Element 4 Wire Y
Phase Order	Phase Rotation	ABC, ACB	ABC
In Method	Measured Neutral current is Direct or Calculated	Measured, Calculated	Measured

The six service configurations include 1 Element 2 Wire, 2 Element 3 Wire 1 Phase, 2 Element 3 Wire Delta, 2 Element 3 Wire Network, 3 Element 4 Wire Wye, and 3 Element 4 Wire Delta.

WARNING

Select the service configuration during initial commissioning. Changing it on a meter already in service invalidates previously recorded data. After changing the configuration, clear all energy, demand, max/min, and power quality records as failure to do so produces mismatched data.

Advanced

Table 5-9 Advanced Settings

Setting	Description	Options	Default
VAR/PF Convention	Sign Convention for Reactive Power and Power Factor.	IEC, IEEE	IEC
Energy Calculation Method	Fundamental uses the fundamental component only. Generic uses the Full Waveform.	Fundamental, Generic	Fundamental
Reactive Power Calculation Method	True uses the Budeanu concept, Calculating from Harmonic Components Rather than the Power Triangle. Generic uses Fryze's concept, Separating Instantaneous Current into Active and Reactive Components.	True, Generic	Generic
Moving Average Window	Number of Cycles Averaged.	1 - 20 Cycles	1
Update Rate	Measurement Update Interval.	1 - 12 Cycles	1

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Energy Pulse

The meter generates output pulses proportional to accumulated energy, which can be supplied to external equipment for secondary metering. The digital output and the pulse LED share the same pulse constant.

Table 5-10 Energy Pulse Settings

Setting	Description	Range	Default
Energy Pulse Constant	Pulses Per Unit of Energy, in imp/kWh, imp/kvarh, or imp/kVAh	0.100 - 100,000.000	1000
LED Pulse Width	Duration of Each Output Pulse	20 - 100 ms	100 ms
LED Pulse Parameter	Energy Parameter Assigned to the Pulse Output. Double-click the Field to Open the Parameter Selector, then Choose a Parameter from the Energy category and click **Apply.** Select **Disable** Under Switch to turn the Pulse Output **OFF.** Available Parameters are 36 System Energy Registers include Active, Reactive, and Apparent Energy in Import, Export, Total, and Net Forms, for Each Phase and System. Use the Search Box at the Top of the Dialog to Filter by Keyword.	Disable, or choose parameter	Disable

Table 5-11 Energy Pulse Parameters

Category	Parameters
Switch	Disable
System Energy	Active Energy Import, Export, Total, Net for Phases A, B, C and System in kWh.
	Reactive Energy Import, Export, Total, Net for Phases A, B, C and System in kvarh.
	Apparent Energy Total for Phases A, B, C and System in kVAh.

The relationship between pulses and energy is: Measured Value (kWh) = Pulse Count ÷ Pulse Constant.

Display

Table 5-12 Display Settings

Setting	Description	Range / Options	Default
Backlight	Display Backlight Duration	0 - 120 Min	1 Min

Non-Standard Seal

Functions can be released from the seal, allowing RS485, Ethernet Setting, Protocol Setting, Clear Loadtime, and Clear Runtime to be modified while the meter remains sealed.

All other sealed functions cannot be modified while the meter is sealed.

Device Description

A user-assigned name for the meter, shown on the **About** page and in Acuview 2.

Time Synchronization

Maximum Sync Interval with a range of 0-168 hours sets the longest permitted period between time synchronizations. If the meter is not synchronized within this period, its time synchronization status changes to **Unsynchronized.**

5.4.1.2 Current & Wiring

To open the page, click the **Setting** tab in the explore panel and select **Metering > Current & Wiring.** After changing any setting, click **Update** and **Confirm** when prompted.

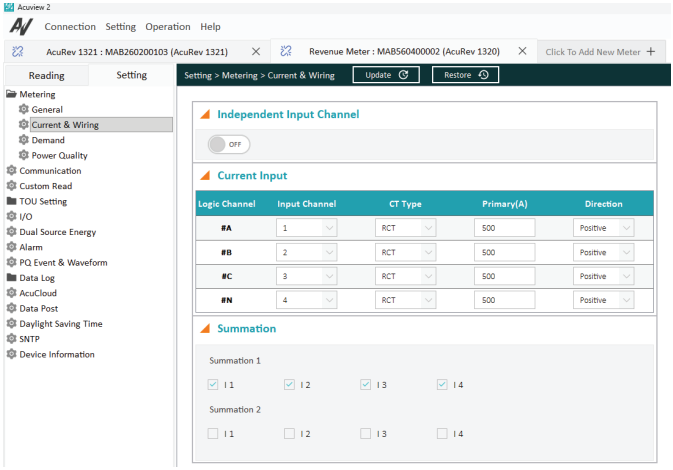


Figure 5-9 Current & Wiring Settings Page

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Current Input

The AcuRev 1320 has four current input channels, each configured independently.

Table 5-13 Current & Wiring Setting Description

Setting	Description	Range / Options	Default
Input Channel	Physical Input Assigned to Logical Channel	1 - 4	Matches the Logical Channel
CT Type	Sensor Type Connected to Channel	80 mA, 100 mA, 333 mV, RCT	-
Primary (A)	CT Primary Current Rating	1 - 50,000 A	1000
Direction	Polarity of Current Input	Positive, Negative	Positive

Correcting wiring errors. Each logical channel maps to its matching physical input by default. If CTs are connected to the wrong phases, reassign the input channel here rather than rewiring the panel; if a CT is installed backwards, set Direction to Negative.

Independent Input Channel

When Independent Input Channel is enabled, the logical channels are labelled #1 to #4 rather than #A, #B, #C, and #N, and a **Voltage Assignment** column appears. Assign each current channel a voltage reference of **None, A, B, C, AB, BC, or CA,** according to the service being metered.

Setting a channel's voltage assignment to **None** disables that channel. When the change is written to the meter, the channel is also removed from any summation group it belongs to.

Summation

Summation 1 and Summation 2 each combine any selection of current channels I1 to I4 into a single energy total.

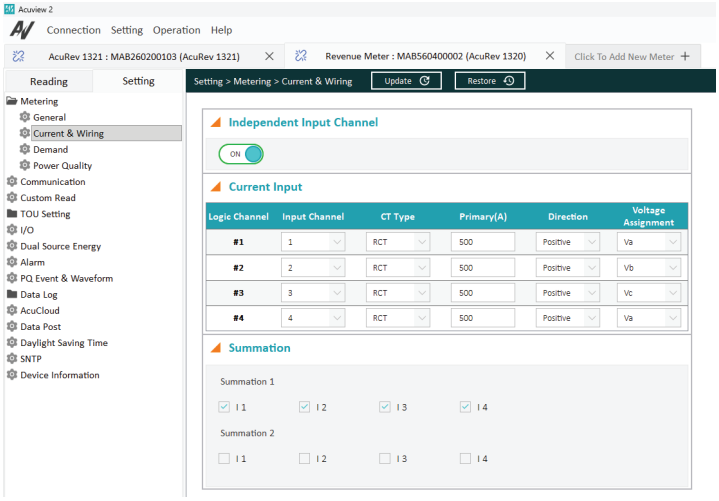


Figure 5-10 Independent Mode Settings Page

5.4.1.3 Demand

To open the page, click the **Setting** tab in the explore panel and select **Metering > Demand.** After changing any setting, click **Update** and **Confirm** when prompted.

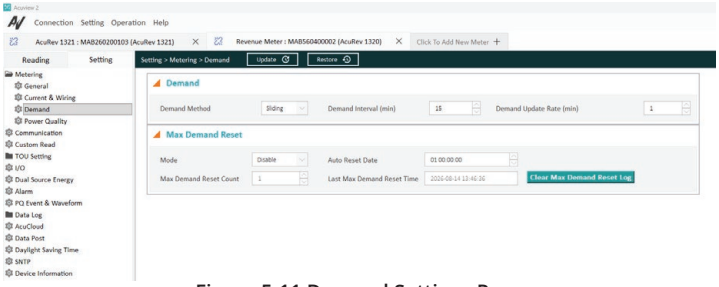


Figure 5-11 Demand Settings Page

Demand

Table 5-14 Demand Setting Description

Setting	Description	Range / Options	Default
Demand Method	Calculation Method used for Demand Values	Fixed, Sliding	Sliding
Demand Interval	Length of Demand Calculation Period	1 - 30 Min	15 Min
Demand Update Rate	Frequency of Demand Value Recalculation and Update	1 - 30 Min	1 Min

Fixed window: The meter averages energy over the demand interval and updates the demand value once at the end of each interval.

Sliding window: The meter averages energy over the demand interval and updates the demand value at each demand update rate, with the window advancing each time.

INFO **Demand Interval** must be greater than or equal to **Demand Update Rate.**

Max Demand Reset

Table 5-15 Max Demand Reset Description

Setting	Description	Range / Options	Default
Mode	Max Demand Clearing Frequency	Disable, Manual Reset, Auto Reset	Disable
Auto Reset Date	Automatic Clearance Time in Day-Hour-Minute-Second Format	Format: dd HH:mm:ss	01 00:00:00
Max Demand Reset Count	Total Reset Count for Max Demand in Read-Only	Range: 0 - 65535	-
Last Max Demand Reset Time	Most Recent Date and Time Reset in Read-Only	-	-

Set **Mode** to **Auto Reset** to clear max demand automatically at the interval defined by **Auto Reset Date.** For example, on the day 01 of every monthly billing period, reset is counted and timestamped.

Clear Max Demand Reset Log resets the count and clears the last reset time. It does not clear the max demand values.

5.4.1.4 Power Quality

To open the page, click the **Setting** tab in the explore panel and select **Metering > Power Quality.** After changing any setting, click **Update** and **Confirm** when prompted.

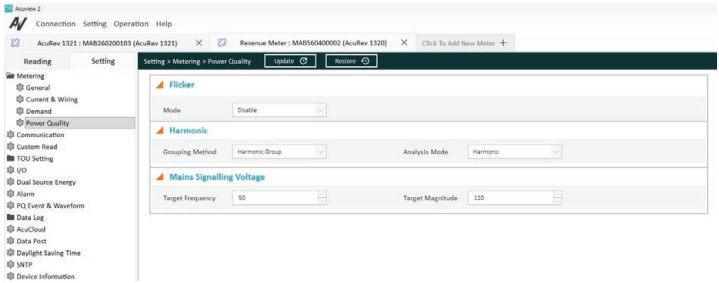


Figure 5-12 Power Quality Settings Page

Flicker

Flicker is only applicable for AcuRev-1322 models only. Measurement evaluates voltage fluctuations against the response of a reference lamp, as defined in IEC 61000-4-15. Select the lamp model matching the supply being monitored.

Table 5-16 Flicker Description

Option	Description
Disable	Turn OFF Flicker Measurement
Automatic	Selection of Lamp Model from the Measured System Voltage and Frequency for General Field Testing.
120V-50Hz-60W Incandescent	60 W Incandescent Lamp on 120 V, 50 Hz Supply
230V-50Hz-60W Incandescent	60 W Incandescent Lamp on 230 V, 50 Hz Supply
120V-60Hz-60W Incandescent	60 W Incandescent Lamp on 120 V, 60 Hz Supply
230V-60Hz-60W Incandescent	60 W Incandescent Lamp on 230 V, 60 Hz Supply

Harmonic

Table 5-17 Harmonic Description

Setting	Description	Options	Default
Grouping Method	Spectral Components Grouping for Harmonic Measurement as per IEC 61000-4-7.	Harmonic Group, Harmonic Subgroup	Harmonic Group
Analysis Mode	Whether Interharmonics Measured in Addition to Harmonics	Harmonic, Harmonic & Inter-harmonic	Harmonic

Harmonic Group includes the adjacent interharmonic bins while the Harmonic Subgroup includes only the two bins immediately adjacent to the harmonic.

Mains Signalling Voltage

Mains signalling is the injection of a control signal onto the supply by the utility, typically for load control or tariff switching. The meter measures the magnitude of a signal at the configured frequency, as defined in IEC 61000-4-30.

Table 5-18 Mains Signal Voltage Description

Setting	Description	Range	Default
Target Frequency	Frequency of the Measured Signal	1 - 500 Hz	50
Target Magnitude	Evaluation of the Reference Magnitude Against the Measured Signal	1 - 300 V	120

5.4.2 Communication

To open the page, click the **Setting** tab in the explore panel and select **Communication.** After changing any setting, click **Update** and **Confirm** when prompted.

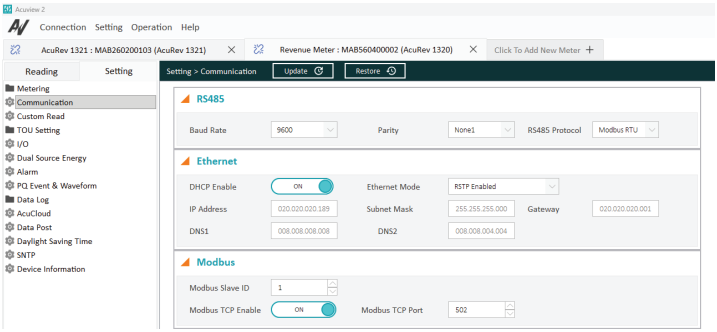


Figure 5-13 Communication Page

RS485

Table 5-19 RS485 Configuration

Setting	Description	Range / Options	Default
Baud Rate	Serial Data Rate	9600, 19200, 38400, 57600, 76800, 115200	19200
Parity	Parity and Stop Bit Configuration	Even, Odd, None1, None2	None1
RS485 Protocol	Serial Port Protocol	Disable, Modbus RTU, BACnet MS/TP	Modbus RTU

Webpage

Modify Password: Opens a dialog for setting a new web password. Enter the new password in New Password and Confirm New Password, then **Click** Apply. The password rules are the same as in Section 4.2. A confirmation appears when the change is complete.

Reset to Default Password: Returns the web password to factory default which is Admin@ followed by the last six digits of the serial number.

Modification and Reset will sign out everyone currently logged in to the web interface.

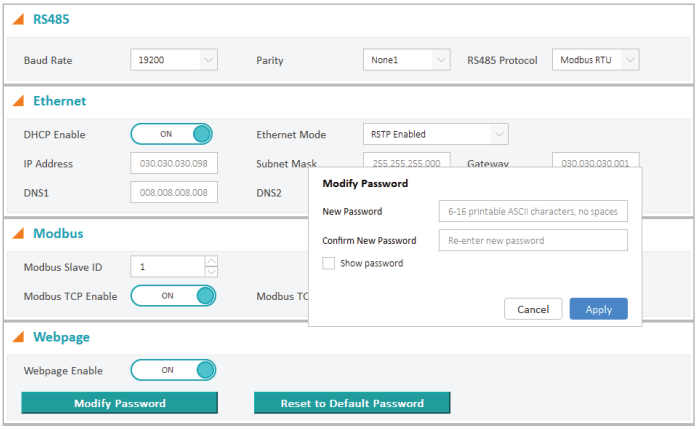


Figure 5-14 Webpage Password Modification

Table 5-20 Meter Access Configuration

Setting	Description	Options	Default
Webpage Enable	Allows Meter to be Accessed from Web Browser	On, Off	On

Ethernet

Table 5-21 Ethernet Configuration

Setting	Description	Range / Options	Default
DHCP Enable	Obtains Network Settings Automatically from DHCP Server	On, Off	-
Ethernet Mode	Port and Redundancy Configuration	RSTP Enabled, Dual ETH (No RSTP), Single ETH (No RSTP)	RSTP Enabled
IP Address	Static IP Address	-	192.168.1.254
Subnet Mask	Subnet Mask	-	255.255.255.0

Setting	Description	Range / Options	Default
Gateway	Default Gateway	-	192.168.1.1
DNS1, DNS2	Primary and Secondary DNS Servers	-	-

When DHCP is enabled, the IP address, subnet mask, gateway, and DNS fields are set automatically and cannot be edited.

Ethernet modes

RSTP Enabled: Both ports are active with Rapid Spanning Tree Protocol (RSTP). For ring or redundant topologies, RSTP provides loop prevention and fast reconvergence after a link failure.

Dual ETH (No RSTP): Both ports are active as a pass-through connection, without loop detection or redundancy.

Single ETH (No RSTP): Only one port is active and the meter operates as a standard single-port device.

INFO

Switching between Dual ETH and Single ETH prompts for confirmation. The change is applied on **Confirm** and does not require clicking **Update.**

WARNING

In **Dual ETH** mode there is no loop detection. Connecting both ports into the same switched network without RSTP will create a broadcast loop.

Table 5-22 Modbus Configuration

Setting	Description	Range / Options	Default
Modbus Slave ID	Address used for Modbus RTU and Modbus TCP	1 - 247	1
Modbus TCP Enable	Enables Modbus TCP	On, Off	On
Modbus TCP Port	TCP Port Assigned to the Meter	1 - 65534	502

BACnet MS/TP & BACnet/IP

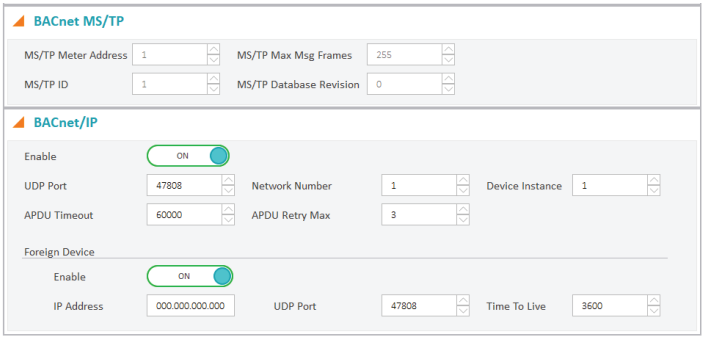


Figure 5-15 BACnet MS/TP and BACnet/IP Configuration

BACnet MS/TP is operated over the RS485 port and is read-only. Electrical parameters can be read, but settings cannot be changed. Set RS485 Protocol to BACnet MS/TP to use it. Energy objects are updated once per second.

Table 5-23 BACnet MS/TP Description

Setting	Description	Range	Default
MS/TP Meter Address	MAC Address on the MS/TP Segment	1 - 127	1
MS/TP Max Msg Frames	Maximum Frames Sent per Token	1 - 255	255
MS/TP ID	BACnet Device Instance	1 - 4,194,303	1
MS/TP Database Revision	Database Revision Number	0 - 65,535	0

Table 5-24 BACnet/IP Description

Setting	Description	Range / Options	Default
Enable	Enables BACnet/IP	On, Off	Off
UDP Port	UDP Port Assigned to the Meter	1 - 65,535	47808
Network Number	BACnet/IP Network Number	0 - 65,534	1
Device Instance	Unique Device Instance on BACnet Network	0 - 4,194,302	1
APDU Timeout	Time in Milliseconds Before Unacknowledged Request is Retried	100 - 65,535	60000
APDU Retry Max	Retry Attempts before Request Fails	0 - 255	3

Foreign Device

Enable Foreign Device only when the meter is on a different IP subnet from the BACnet client. The meter then registers with a BACnet Broadcast Management Device (BBMD) on the client's subnet to receive broadcast traffic. If the meter and client share a subnet, leave this as **off.**

Table 5-25 Foreign Device Description

Setting	Description	Range / Options	Default
Enable	Enables Foreign Device Registration	On, Off	Off
IP Address	Address of the BBMD	-	0.0.0.0
UDP Port	UDP Port of the BBMD	1 - 65,535	47808
Time To Live	Registration Lifetime in Seconds Before Meter Re-Registers	0 - 65,535	3600

5.4.3 Custom Read

Custom Read builds a user-defined block of Modbus registers, allowing a SCADA or building management system to retrieve a chosen set of parameters in a single request rather than reading each one from its native address. This reduces polling traffic and simplifies integration.

To open the page, click the **Setting** tab in the explore panel and select **Custom Read.** After changing the selection, click **Update** and **Confirm** when prompted.

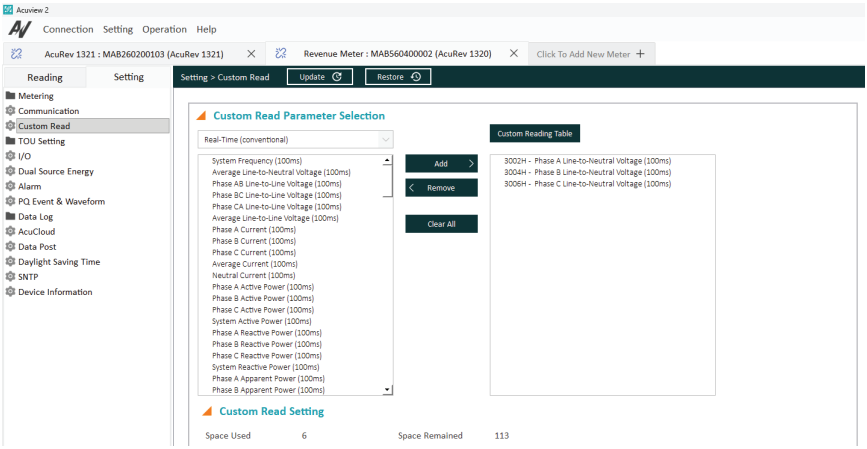


Figure 5-16 Custom Read Settings

To build a custom read table:

1. Select a parameter category from the list at the top left.
2. Select one or more parameters and click **Add** to move the parameters into the **Custom Reading Table.**
3. To remove a parameter, select it in the table and click **Remove. Clear All** empties the table.
4. Click **Update** and **Confirm.**

Each entry in the custom reading table shows the parameter's register address followed by its description.

Table 5-26 Parameter Categories Description

Category	Update Interval / Method	Contents	Model Availability
Real-Time	Conventional	Live Measurements	AcuRev 1320 Series
Real-Time	1 Cycle	Live Measurements	AcuRev-1322 Model
Real-Time	Moving Average	Live Measurements over the Configured Moving Average Window	AcuRev-1322 Model
Real-Time	10 / 12 Cycle	Live Measurements	AcuRev 1320 Series
Real-Time	150 / 180 Cycle	Live Measurements	AcuRev-1322 Model
Real-Time	10 min	Live Measurements Aggregated over 10 Minutes	AcuRev-1322 Model
Real-Time	2 hr	Live Measurements Aggregated over 2 Hours	AcuRev-1322 Model
Energy	Conventional	Accumulated Energy	AcuRev 1320 Series
Energy	1 Cycle	Energy Update Rate	AcuRev-1322 Model
Energy	1 Second	Energy Updated Every Second	AcuRev 1320 Series
Quadrant Energy	1 Second	Four-Quadrant Energy Updated every Second	AcuRev 1320 Series
Harmonics-THD	Conventional	Total Harmonic Distortion	AcuRev 1320 Series
Demand	-	Present and Predictive Demand	AcuRev 1320 Series
Dual Source Energy	-	Grid and Generation Energy Registers	AcuRev 1320 Series
DI Status	-	Digital Input States	AcuRev 1320 Series
Flicker	-	Flicker Measurements	AcuRev-1322 Model
Voltage Harmonics	10 / 12 Cycle	Voltage Harmonics at Interval	AcuRev 1320 Series
Voltage Harmonics	150 / 180 Cycle	Voltage Harmonics at Interval	AcuRev-1322 Model
Voltage Harmonics	10 min	Voltage Harmonics Aggregated over 10 Minutes	AcuRev-1322 Model
Voltage Harmonics	2 hr	Voltage Harmonics Aggregated over 2 Hours	AcuRev-1322 Model
Current Harmonics	10 / 12 Cycle	Current Harmonics at Interval	AcuRev 1320 Series

Category	Update Interval / Method	Contents	Model Availability
Current Harmonics	150 / 180 Cycle	Current Harmonics at Interval	AcuRev-1322 Model
Current Harmonics	10 min	Current Harmonics Aggregated over 10 Minutes	AcuRev-1322 Model
Current Harmonics	2 hr	Current Harmonics Aggregated over 2 Hours	AcuRev-1322 Model

Capacity

The Custom Read Setting section shows **Space Used** and **Space Remained.** The custom read table holds up to 119 register spaces where each parameter consumes the number of registers required by its data type.

To export the register map

Click **Custom Reading Table** to open the **Export Table** dialog, which lists each parameter with its **Data Type, Start Address,** and **Register Count.** Click **Export Table** to save the map as a CSV file for use when configuring the client system.

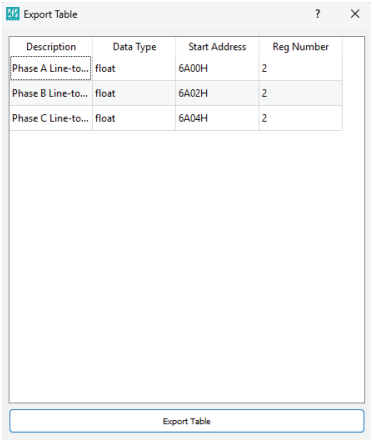


Figure 5-17 Export Table Dialog

To view custom read values

Parameters added to the **Custom Read Table** can be viewed live under **Reading > Custom Read Reading,** listed by index with their current values.

5.4.4 TOU Setting

5.4.4.1 TOU

The AcuRev 1320 supports a Time-of-Use (TOU) function that accumulates energy and maximum demand into separate tariff registers based on a user-defined calendar. Navigate to **Setting → TOU Setting → TOU** to configure the function.

Set **Enable TOU** to **ON** to activate the function. The **Setting Status** field indicates whether the current configuration is accepted by the meter. **Valid** means the calendar is complete and consistent, while **Invalid** indicates a configuration conflict that must be corrected before the settings take effect. Hover over **Invalid** to see the errors.

After making any changes, click **Update** to write the settings to the meter. If the configurations are correct, then **Setting Status** will change from **Invalid** to **Valid. Restore** reloads the settings currently stored in the meter and **Reset To Default** returns all TOU parameters to their factory values.

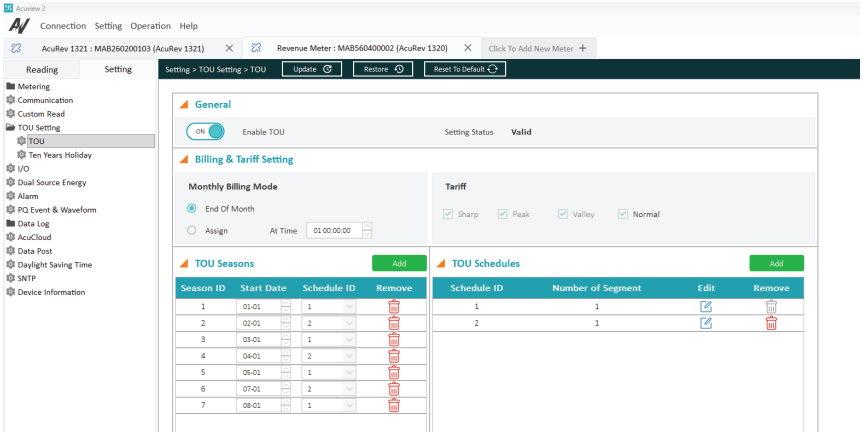


Figure 5-18 TOU Settings

Billing & Tariff Setting

Monthly Billing Mode: Determines when the meter closes out the current billing period and transfers the current month's TOU data to the previous month registers. Two modes are available:

- **End Of Month:** Billing is performed automatically at the end of the last day of each month.
- **Assign:** Billing is performed on a user-defined day and time of each month. Enter the value in the **At Time** field using the format DD HH:MM:SS . For example, 01 00:00:00 performs billing at midnight on the first day of each month.

Tariff: The meter supports up to four tariffs. Tariffs are enabled cumulatively in the following order, so the number of tariffs selected determines which ones are available for assignment:

Table 5-27 Tariff Types

Number of Tariffs	Tariffs Enabled
1	Sharp
2	Sharp, Peak
3	Sharp, Peak, Valley
4	Sharp, Peak, Valley, Normal

INFO **Sharp** is always enabled and cannot be deselected.

TOU Seasons

A season defines a period of the year that uses a particular daily schedule. Up to **12 seasons** can be configured.

Click **Add** to create a season, then define:

- **Season ID:** Assigned automatically in the order the seasons are created.
- **Start Date:** The date the season begins, entered in MM-DD format. Each season remains active until the start date of the next season. The final season of the year wraps around to the start date of the first season.
- **Schedule ID:** The TOU schedule applied to every day within that season.

Click to delete a season.

TOU Schedules and Segments

A schedule defines how a 24-hour day is divided into tariff periods. Up to **14 schedules** can be configured, and each schedule can contain up to **14-time segments.**

1. Click **Add** in the **TOU Schedules** panel to create a schedule, then click the icon to open the schedule editor.

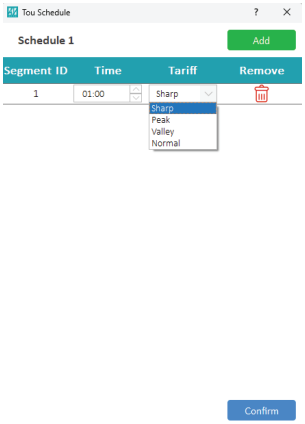


Figure 5-19 TOU Schedule Editor

2. Within the editor, click **Add** to insert a segment and define:

- **Segment ID:** Assigned automatically in the order the segments are created.
- **Time:** The start time of the segment, entered in HH:MM format. Each segment remains in effect until the start time of the next segment. The last segment of the day continues until the start time of the first segment.
- **Tariff:** The tariff applied during the segment which can be Sharp, Peak, Valley, or Normal. Only tariffs enabled under Billing & Tariff Setting can be selected.

3. Click **Confirm** to save the schedule and return to the main TOU page.

TOU Holidays

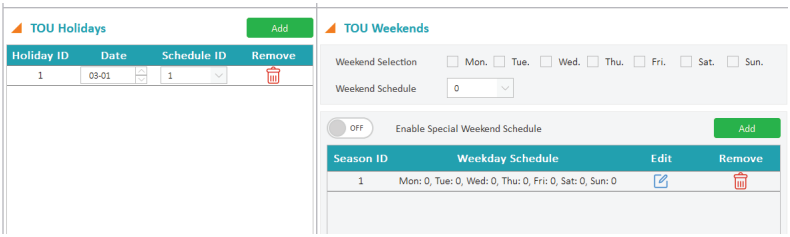


Figure 5-20 TOU Holidays and Weekends Configuration

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Up to **30 holidays** can be programmed into the TOU calendar. Click **Add** in the **TOU Holidays** panel and define:

- **Holiday ID:** Assigned automatically in the order the holidays are created.
- **Date:** The date of the holiday, entered in MM-DD format.
- **Schedule ID:** The TOU schedule applied on that date, which overrides the schedule that the season or weekend setting would otherwise apply.

> **INFO** Holidays have the highest priority in the TOU calendar. If a holiday falls on a day that is also configured as a weekend, the holiday schedule is used.

TOU Weekends

Weekend settings allow specific days of the week to use a different schedule from the one assigned to the active season.

- **Weekend Selection:** Select the days of the week to be treated as weekends. Any combination of Mon. through Sun. can be selected.
- **Weekend Schedule:** Select the schedule applied to all selected weekend days. A value of 0 disables the weekend schedule, in which case weekend days follow the schedule assigned to the active season.

Enable Special Weekend Schedule

When this option is set to **OFF,** the **Weekend Selection** and **Weekend Schedule** settings above apply uniformly throughout the year. Setting it to **ON** allows a schedule to be assigned to each individual day of the week, configured separately for each season.

This supports applications where the weekly tariff pattern changes between seasons.

For example, using a different schedule on Saturdays than on Sundays, or applying weekend rates only during summer months.

To configure a special weekend schedule:

1. Click **Add** to create an entry. The Season ID is assigned automatically in the order the entries are created and supports up to 12 seasons.
2. Click ✎ to open the **Weekend Schedule** dialog for that season.
3. Select the checkbox for each day of the week that requires a dedicated schedule, then choose the applicable **Schedule** ID from the adjacent dropdown. A value of 0 means no special schedule is applied, and that day follows the schedule assigned to the active season.
4. Click **Confirm** to save the entry and return to the main TOU page.

The configured assignments are displayed in the **Weekday Schedule** column of the table, listing the schedule ID applied to each day from Monday through Sunday.

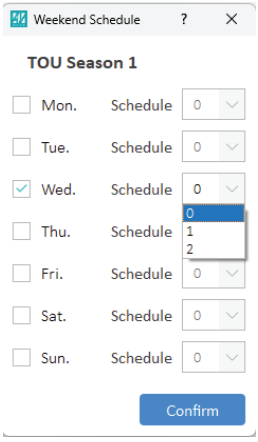


Figure 5-21 Special Weekend Schedule Configuration

INFO Calendar priority is applied in the following order, from highest to lowest **Holiday → Weekend → Season.**

5.4.4.2 Ten Years Holiday

The Ten Years Holiday function extends the TOU calendar with a multi-year holiday table, allowing holidays that fall on different dates each year, such as moveable public holidays, to be programmed in advance. Navigate to Setting → TOU Setting → Ten Years Holiday to configure the function.

Set the toggle to **ON** to enable the function, then define the calendar range:

- **Start Year / End Year:** The first and last year covered by the holiday calendar. The range must not exceed 10 years.
- **Available Schedule:** A read-only field showing the number of TOU schedules currently defined under **Setting → TOU Setting → TOU.** Only schedule IDs within this range can be assigned to a holiday.

Each year is displayed in its own panel, from **1st Year Holidays** through **10th Year Holidays,** with the corresponding calendar year shown beside the panel title. Click Add within a panel to create a holiday entry for that year, then define:

- **Holiday ID:** Assigned automatically in the order the holidays are created. Each year supports a maximum of 30 holidays.
- **Date:** The date of the holiday, entered in MM-DD format.
- **Schedule ID:** The TOU schedule applied on that date.

Because each year is configured independently, a holiday that shifts from year to year can be entered with the correct date in each panel. Click the icon to delete an individual entry, or **Clear** to erase all holiday entries across every year.

Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

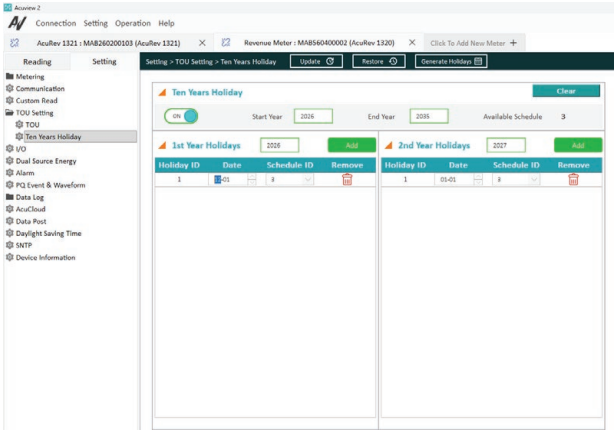


Figure 5-22 TOU Ten Years Holiday Schedule

Auto-Generating the Holiday Calendar

Entering ten years of holidays manually is time-consuming, so the meter provides an auto-generation tool that populates all years from a single set of rules. Click **Generate Holidays** to open the **Ten Years Holiday Auto Generation** dialog.

Click **Add** to create a rule, then define:

- **Index:** Assigned automatically in the order the rules are created.
- **Date:** The base date of the holiday in the first year, entered in MM-DD format.
- **Holiday Code:** The rule that determines how the date is calculated in each subsequent year. See the table below.
- **Schedule:** The TOU schedule applied on the resulting date.

Table 5-28 Holiday Code Description

Holiday Code	Action
0	Single Event on the Specified Date in the First Year
1	Occurs on the Same Date Every Year
2	Occurs on the Specified Date and Observed the Following Monday if the Date Falls on a Sunday
3	Occurs on the Specified Date and Observed the Following Monday if the Date Falls on a Sunday, or the Preceding Friday if it Falls on a Saturday
4	Occurs on the First Sunday After the Specified Date
5	Occurs on the First Monday After the Specified Date
6	Occurs on the First Thursday After the Specified Date

Once all rules are defined, click **Generate.** The meter calculates the correct date for each holiday in every year of the configured range and populates the year panels automatically.

Rule sets can also be saved and reused across meters. Click **Export** to save the current rules as a **.tyh** file or **Import** to load a previously saved **.tyh** file.

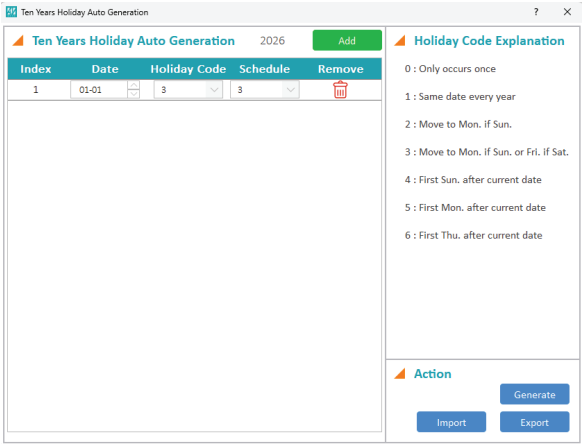


Figure 5-23 TOU Ten Years Holiday Auto-Generation

INFO

Auto-generation overwrites the existing holiday entries in all year panels. If a specific year requires an exception, such as a one-off national holiday, then generate the calendar first, then edit that year's panel directly.

5.4.5 I/O

The AcuRev 1320 provides **3 Digital Inputs (DI)** and **1 Digital Output (DO)** on board. Navigate to **Setting → I/O** to configure the I/O. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

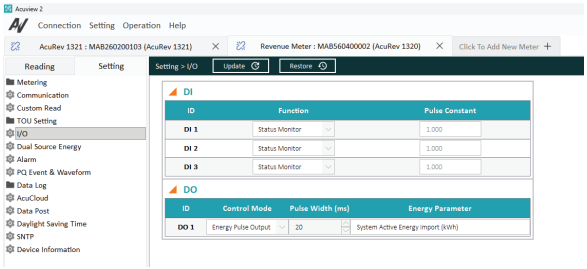


Figure 5-24 I/O Module Settings

Digital Input (DI)

Each of the three digital inputs can be independently configured for one of two functions using the **Function** dropdown: **Status Monitor** or **Pulse Counter**.

Status Monitor Function

- Monitors the status of an external contact and records any change of state.
- When the status changes, the meter records an SOE (Sequence of Events) entry containing both the new status and a timestamp.
- If the DI is also assigned as an input parameter in the Alarm function, alarm events are triggered according to the configured alarm logic. If it is not linked to the Alarm function, only SOE records are stored.
- The Pulse Constant field is not used in this mode.

Pulse Counter Function

- Used for pulse metering, recording both the raw pulse count and the converted physical measurement.
- A **Pulse Constant** must be entered as the conversion reference. The valid range is **0.100 to 100000.000,** with a default of **1.000.**

Table 5-29 Physical Measurement Formula

Pulse Constant Unit	Conversion
kWh/imp	Physical Measurement = Pulse Count × Pulse Constant

DI counts and status can be viewed under **Reading → I/O Reading,** where counters can also be reset.

Table 5-30 DI Specifications

Parameter	Value
Type	Dry Contact
External Supply Voltage Range	20 - 30 V AC / 20 - 60 V DC
Maximum Pulse Frequency	50 Hz, 50% duty cycle (10 ms ON, 10 ms OFF)
On-state Voltage	15 V DC
Off-state Voltage	5 V DC
Isolation Voltage	2500 V AC

Digital Output (DO)

The digital output is configured using the **Control Mode** dropdown, which offers three modes: **Energy Pulse Output, Alarm Indication,** and **Manual Control.**

Energy Pulse Output

In this mode the output generates pulses proportional to accumulated energy, allowing an external device to perform secondary metering.

- Pulse Width (ms): The duration of each output pulse. The default is 100 ms and the valid range is 20 to 3000 ms.
- Energy Parameter: The energy quantity used as the pulse source. Double-click the Energy Parameter field to open the Parameter Selector dialog, expand the Energy category, and choose a parameter:
  - **Switch -** Select **Disable** to turn off pulse output without changing the control mode.
  - **System Energy -** Select the energy quantity to be output, such as **System Active Energy Import (kWh), Phase A Active Energy Import (kWh),** or **System Active Energy Total (kWh).** Keywords can be entered in the search field at the top of the dialog to filter the list.

Click **Apply** to confirm the selection or **Cancel** to close the dialog without changes.

- The number of pulses generated per unit of energy is set by the Energy Pulse Constant, in units

of imp/kWh, imp/kvarh, or imp/kVAh. This constant is shared by all pulse outputs on the meter, including DO1 and the front-panel LED, and is configured under Setting → Metering → General → Energy Pulse → Energy Pulse Constant or see Section 5.4.1.1.

- The relationship between pulses and energy is: Measured value (kWh) = Pulse count ÷ Pulse constant

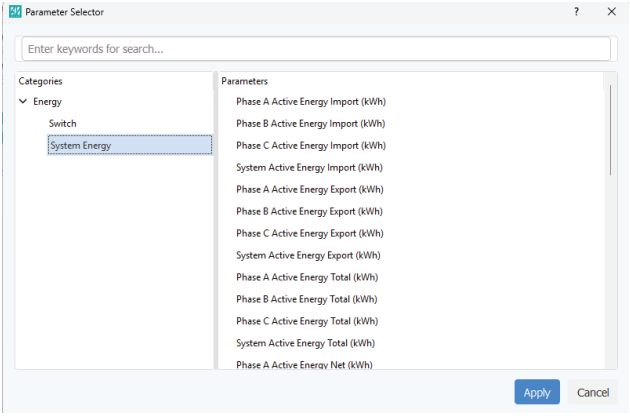


Figure 5-25 Energy Parameter Selection

Alarm Indication

- The output is activated when a user-defined alarm event occurs, as configured in the **Alarm** menu.
- The output is cleared automatically when the alarm condition returns to normal.

Manual Control

- The output state is controlled directly by the user, allowing DO1 to be switched ON or OFF on demand from Reading → I/O Reading or over communications. This mode is typically used for remote control of external equipment and for commissioning or testing the output circuit.

Table 5-31 DO Specifications

Parameter	Value
Type	Photo-MOS
Voltage Range	0 - 30 V AC / 0 - 60 V DC
Maximum Load Current	100 mA

Parameter	Value
Maximum Frequency	25 Hz, 50% Duty Cycle (20 ms ON, 20 ms OFF)
Isolation Voltage	2500 V AC

INFO

The maximum output frequency of 25 Hz corresponds to a 20 ms pulse width. If a longer pulse width is configured, the achievable output frequency is reduced accordingly. Select a pulse width and energy pulse constant that together keep the pulse rate within the capability of the receiving device at peak load.

5.4.6 Dual Source Energy

The Dual Source Energy function is intended for installations supplied by two energy sources, typically the utility grid and on-site generation such as Distributed Generation (DG). The meter accumulates energy into separate **Grid** and **Generator** registers according to active source, allowing consumption and generation to be billed or reported independently through a single measurement point.

Navigate to **Setting → Dual Source Energy** and set the toggle to **ON** to enable the function. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

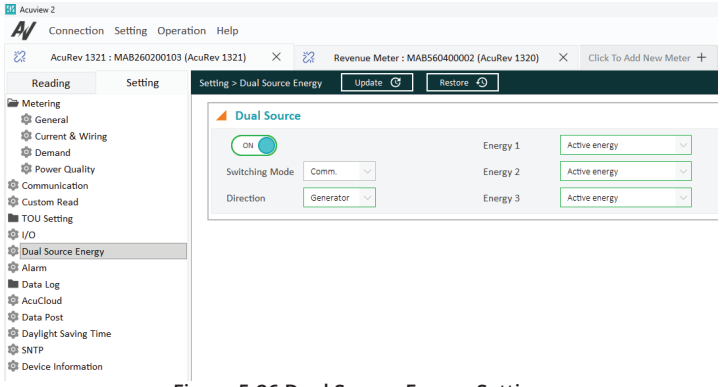


Figure 5-26 Dual Source Energy Settings

Energy Parameter Selection

Up to three energy quantities, **Energy 1, Energy 2,** and **Energy 3,** can be accumulated separately for each source. Select the data source for each from the corresponding dropdown.

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Table 5-32 Energy Selection Options

Value	Parameter	Value	Parameter
0	Undefined (Not Selected)	7	Phase B Reactive Energy
1	Active Energy	8	Phase C Reactive Energy
2	Phase A Active Energy	9	Apparent Energy
3	Phase B Active Energy	10	Phase A Apparent Energy
4	Phase C Active Energy	11	Phase B Apparent Energy
5	Reactive Energy	12	Phase C Apparent Energy
6	Phase A Reactive Energy		

INFO

When the **Independent Input Channel** function is enabled, the parameter list is populated from the independent input channel data rather than the basic measurement parameters.

Switching Mode and Direction

The **Switching Mode** determines how the meter is informed about the source currently supplying power, and this in turn determines whether the **Direction** field is writable.

Table 5-33 Switching Mode Description

Switching Mode	Source Selection	Direction Field	Log Entry Generated
Comm.	Written Over Communications by a Master Device or Control System	Read / write. Write the Value to Switch the Active Source	On Each Change between Grid and Generator
DI 1	Determined by the State of Digital Input 1	Read-only. Displays the Current Source	On each DI Open/Close Transition
DI 2	Determined by the State of Digital Input 2	Read-only. Displays the Current Source	On each DI Open/Close Transition
DI 3	Determined by the State of Digital Input 3	Read-only. Displays the Current Source	On each DI Open/Close Transition

The **Direction Field** indicates the source to which energy is currently being attributed.

Table 5-34 Direction Field Description

Value	Direction	Description
0	Grid	Energy Accumulated to Grid Registers
1	Generator	Energy Accumulated to Generation Registers

INFO When a digital input is used as the switching source, that DI should be configured for **Status Monitor** under **Setting → I/O** or view Section 5.4.5.

5.4.7 Alarm

The AcuRev 1320 supports **20 alarm groups,** each monitoring up to two parameters combined by a logic operator. The meter stores up to **200 alarm logs** in a rolling buffer, where the oldest record is overwritten once the buffer is full. Alarm logs can also be cleared using Modbus commands.

Navigate to **Setting → Alarm** to configure the alarm groups. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

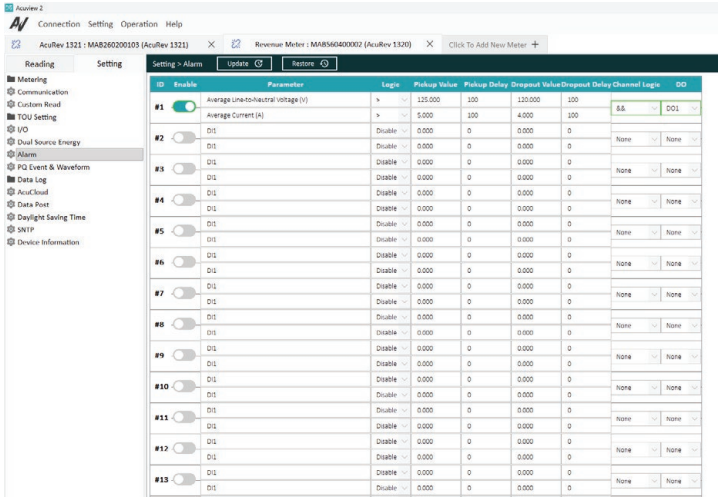


Figure 5-27 Alarm Settings

Configuring an Alarm Group

Each alarm group is identified by an **ID** from #1 to #20 and occupies two rows in the table. The

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upper row for the first monitored parameter (P1) and the lower row for the second (P2). Set the **Enable** toggle to **ON** to activate the group.

Selecting a Parameter

Double-click the **Parameter** field to open the **Parameter Selector** dialog. Parameters are organised into the following categories:

Table 5-35 Selecting Parameters in Alarm Settings

Category	Available Groups
System Basic	Demand, RMS for 1 Cycle
Unbalance	Unbalance I for 1 Cycle, Unbalance V for 1 Cycle
Harmonic	Current Angle Harmonics, Current Harmonics Group, Current Magnitude Harmonics, Current THD, Voltage Angle Harmonics, Voltage Harmonics Group, Voltage Magnitude Harmonics, Voltage THD
DI	DI Status

Select a group to display its parameters in the right-hand pane or enter a term in the search field at the top of the dialog to filter across all categories. Select the required parameter and click **Apply** to confirm or **Cancel** to close without changes.

Setting the Trigger Condition

Each parameter has its own comparison logic and thresholds:

Table 5-36 Alarm Trigger Settings

Field	Description
Logic	The comparison applied to the parameter: • **>** for Greater Than • **<** for Less Than • **Disable** to Exclude the Parameter from the Group
Pickup Value	Threshold at which the Alarm Condition becomes True
Pickup Delay	Pickup Condition Time in Milliseconds to Persist Before Alarm is Triggered
Dropout Value	Threshold at which the Alarm Condition is Cleared
Dropout Delay	Dropout Condition Time in Milliseconds to Persist Before the Alarm is Released

The separate pickup and dropout thresholds provide a deadband that prevents repeated triggering when a measured value fluctuates around a single setpoint.

Channel Logic

The **Channel Logic** field defines the method of combining two parameters in a group.

Table 5-37 Parameter Combination Logic

Setting	Operator	Alarm Triggered	Alarm Released
None	—	Only P1 is Evaluated and P2 is Ignored	When P1 meets its Dropout Condition
&&	AND	When Both P1 and P2 Meet Required Pickup Conditions	When Either P1 or P2 Meets Dropout Condition
||	OR	When Either P1 or P2 meets Pickup Condition	When Both P1 and P2 Meet Dropout Conditions

Alarm Output

The **DO** field assigns a digital output to the alarm group. Select **DO1** to energise the output while the alarm is active, or **None** if no physical output is required. The output is cleared automatically when the alarm is released.

Configuration Example

The following configuration triggers Alarm Group 1 when the average voltage and current is high at the same time.

Table 5-38 Alarm Trigger Configuration Example

Setting	Parameter 1	Parameter 2
Parameter	Average Line-to-Neutral Voltage	Average Current
Logic	>	>
Pickup Value	125 V	5 A
Pickup Delay	100 ms	100 ms
Dropout Value	120 V	4 A
Dropout Delay	100 ms	100 ms

With **Channel Logic** set to **&&** and **DO** set to **DO1:**

- The alarm activates when the average voltage exceeds 125 V for at least 100 ms and the average current exceeds 5 A for at least 100 ms. DO1 is energised and an alarm log entry is recorded.

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- The alarm releases when average voltage falls below 120 V for at least 100 ms or average current falls below 4 A for at least 100 ms. DO1 returns to its normal state.

INFO

If the expected DI or DO options are unavailable in the Alarm settings, verify the I/O configuration under **Setting → I/O.**

A digital input must be configured for **Status Monitor** before it can be selected as an alarm parameter, and DO1 must be set to **Alarm Indication** control mode before it can be assigned as an alarm output.

5.4.8 PQ Event & Waveform

The AcuRev 1320 provides user-configurable Power Quality (PQ) event detection together with a waveform recording function. Navigate to **Setting → PQ Event & Waveform** to configure both. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

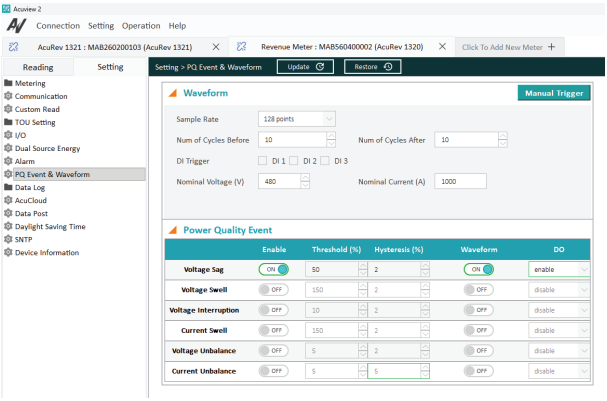


Figure 5-28 PQ Event & Waveform Settings

Waveform Recording

The meter captures voltage and current waveforms around a trigger point, allowing the shape of a disturbance to be examined after the event. Up to **200 waveform records** are stored in flash memory in a rolling buffer. Once the buffer is full, the oldest record is overwritten. Recorded waveforms are viewed under **Reading → Power Quality Event Analysis → Waveform Log.**

Trigger Modes and Recording Settings

Waveform recording can be initiated in three ways.

Table 5-39 Trigger Description

Trigger Mode	Description
Manual Trigger	Click **Manual Trigger** and confirm to capture a record immediately. Va, Vb, Vc, Ia, Ib, Ic, and In are recorded.
DI Trigger	Select **DI 1, DI 2,** or **DI 3** to capture a record when the corresponding digital input is activated. All channel currents and the three-phase voltages are recorded.
PQ Event Trigger	Enabled per event type using the **Waveform** toggle in the Power Quality Event table. Voltage related events record the three-phase voltages only. Current related events record all channel currents together with the three-phase voltages of the affected channel.

Table 5-40 Recording Settings

Setting	Description	Range	Default
Sample Rate	Number of Samples Captured Per Cycle.	16, 32, 64, 128, 256, or 512 points	128 points
Num of Cycles Before	Cycles Recorded Before Trigger Point	1 - 159	10
Num of Cycles After	Cycles Recorded After Trigger Point	1 - 159	10
Nominal Voltage (V)	Reference Voltage against which Voltage Event Thresholds are Evaluated	50 - 1,000,000	480
Nominal Current (A)	Reference Current against which Current Event Thresholds are Evaluated	1 - 50,000	1000

Each waveform record is limited to a total of **2560 samples.** The sample rate and the cycle counts must therefore be selected together, according to the following relationship:

Sample Rate × (Num of Cycles Before + Num of Cycles After) ≤ 2560

The sample rate determines the total number of cycles that can be captured in a single record.

Table 5-41 Maximum Cycle Capture

Sample Rate	Maximum Total Cycles Captured Before and After Event
16 Points	159
32 Points	80
64 Points	40

Sample Rate	Maximum Total Cycles Captured Before and After Event
128 Points	20
256 Points	10
512 Points	5

The pre- and post-trigger cycles can be distributed within this total.

For example: At a sample rate of **256 points,** the combined window is limited to 10 cycles. This could be configured as 1 cycle before and 9 cycles after, or 5 cycles before and 5 cycles after, or any other combination that totals 10.

INFO

A higher sample rate provides greater detail for analysing fast transients, but it consumes more memory per record and shortens the recordable window.

A lower sample rate captures a longer period at reduced resolution. Select the combination that suits the type of disturbance being investigated.

Power Quality Events

Six event types are supported, each configured independently in the **Power Quality Event** table.

Table 5-42 PQ Event Settings

Event Type	Threshold Range (%)	Default (%)
Voltage Sag	10 - 90	50
Voltage Swell	110 - 150	150
Voltage Interruption	5 - 20	10
Current Swell	110 - 150	150
Voltage Unbalance	5 - 50	5
Current Unbalance	5 - 50	5

Each event provides the following settings.

Table 5-43 PQ Event Configuration

Field	Description
Enable	Set to **ON** to Activate Detection for the Selected Event Type
Threshold (%)	Pickup Level at which the Event is Declared Expressed in Percentage of the Nominal Voltage or Current

Field	Description
Hysteresis (%)	Deadband applied to the Release Level Prevents Repeated Triggering when Measured Value Fluctuates around the Threshold Range: 1 – 10 % for all Event Types Default: 2%
Waveform	Set to **ON** to Capture Waveform Record when Event Detected
DO	Select **enable** to Energise DO1 while the Event is Active, or **disable** if No Output Required

Configuration Constraints

The following relationships must be observed, otherwise the settings will be rejected.

- For voltage and current unbalance, the **Threshold** must be greater than the **Hysteresis.**
- The **Voltage Sag** threshold must be at least 10% higher than the **Voltage Interruption** threshold, so that the two conditions do not overlap.

When a PQ event occurs, an event log is written to flash memory automatically. Up to **200 PQ event logs** are stored in a rolling buffer, with the oldest record overwritten once the buffer is full. Event logs are viewed under **Reading → Power Quality Event Analysis → Power Quality Events Log.**

INFO Power quality event detection and waveform capture are available only on the AcuRev-1322 models.

5.4.9 Data Log

The AcuRev 1320 is equipped with four independent data loggers, allowing measurement data to be captured, classified, and analysed in different ways. Each logger is configured separately under **Setting → Data Log.** Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

- **Data Log 1, 2, and 3** are the real-time loggers that record the instantaneous value of each selected parameter at the configured interval.
- **Trend Log** records the maximum, minimum, and average value of each selected parameter over each logging interval.

Using the real-time loggers alongside the trend logger allows both instantaneous behaviour and long-term trends to be evaluated from the same device.

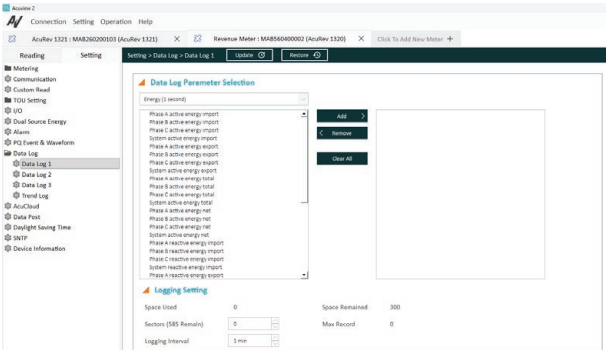


Figure 5-29 Data Log Settings

Data Log Parameter Selection

Each logger records one category of parameters at a time. Select the category from the dropdown at the top of the panel, then choose parameters from the list on the left and click **Add** to move the selected parameters into the selection pane on the right. Use **Remove** to deselect an individual parameter or **Clear All** to empty the selection.

The categories available depend on the logger type.

Table 5-44 Data Log Categories

Category	Log Interval	Data Log 1 - 3	Trend Log
Energy	1 Second	✓	-
Quadrant Energy	1 Second	✓	-
RMS	10 / 12 Cycle	✓	✓
Unbalance V	10 / 12 Cycle	✓	✓
Unbalance I	10 / 12 Cycle	✓	✓
Demand	-	✓	-
Dual_Source_Energy	-	✓	✓
DI_Pulse_Count	-	✓	✓
THD	-	✓	✓
Harmonic V	10 / 12 Cycle	✓	✓
Harmonic I	10 / 12 Cycle	✓	✓

A combined total of **300 parameter entries** can be selected across all loggers. The **Space Used** and **Space Remained** fields show the count of entries that are currently allocated and available.

Logging Setting

Table 5-45 Data Log Description

Field	Description	Range
Space Used	Number of Read-only Parameter Entries Currently Allocated	-
Space Remained	Number of Read-only Parameter Entries Available	-
Sectors	Memory allocated to this Logger Value in Parentheses Beside the Field Label Shows the Sectors that are Unallocated which Decreases as Sectors are Assigned. For example: Sectors (585 Remain)	Data Log 1 - 3: 0 - 585 Trend Log: 0 - 195
Logging Interval	Time between Records, in minutes	1 - 1440
Max Record	Number of Read-only Records the Logger can Hold Calculated from the Allocated Sectors and the Number of Parameters Selected	-

Memory is allocated in sectors. Data Logs 1 to 3 draw from a **shared pool of 585 sectors,** so assigning sectors to one logger reduces the number available to the other two.

The Trend Log has its own dedicated allocation of **195 sectors.**

Table 5-46 Data Log Record Size

Logger	Sectors Available	Maximum Records
Data Log 1 - 3 Combined	585	3,194,685
Trend Log	195	1,064,895

The maximum record figures represent the capacity of the full sector allocation with a minimum parameter selection. Selecting more parameters increases the size of each record and reduces the number of records that can be stored, as reflected in the **Max Record** field.

INFO

Plan the sector allocation across Data Logs 1 to 3 before configuring individually.

Assigning the full 585 sectors to one logger leaves no available memory for the other two.

Logging Mode

Three logging modes are available. Set the toggle on the required mode to **ON.** The modes are mutually exclusive.

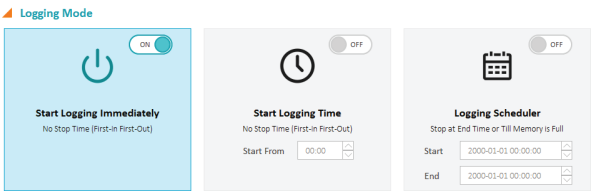


Figure 5-30 Data Log Modes

Table 5-47 Data Log Mode Description

Mode	Description	Action when Memory is Full
Start Logging Immediately	Logging Begins as Soon as the Settings are Written to the Meter with **Update**	First-in First-out Oldest record is Over-written
Start Logging Time	Logging begins at a Fixed Time Each Day Entered in **HH:MM** Format in the **Start From** Field	First-in First-out Oldest record is Over-written
Logging Scheduler	Logging Runs between a Defined **Start** and **End** Entered in **YYYY-MM-DD HH:MM:SS** Format	Logging Stops at End Time or When Memory is Full, Whichever Occurs First

INFO

In **Logging Scheduler** mode, records are retained rather than overwritten, so the logger stops once its allocated memory is full even if the end time has not been reached.

Confirm that the allocated sectors and logging interval cover the intended period before starting a scheduled log.

5.4.10 AcuCloud

The AcuRev 1320 can record, cache, and push measurement data to AcuCloud, a cloud-based energy management platform from Accuenergy. Once linked, the meter uploads data automatically, allowing readings to be viewed and analysed remotely without a local connection to the device.

Navigate to **Setting** → **AcuCloud** to configure the function. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

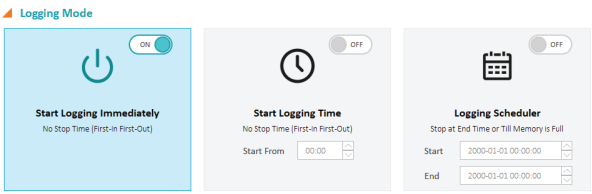


Figure 5-31 AcuCloud Settings

Table 5-48 AcuCloud Description

Field	Description
Enable	Set the toggle to **ON** to activate data upload to AcuCloud
SN	Read-Only Meter Serial Number Used to Register the Device on the AcuCloud platform Click **Copy** to Copy the Value to the Clipboard
Token	Authentication Token Issued by AcuCloud When the Device is Registered Paste the token into this Field to Authorise the Meter to Upload Data

The following controls are also available:

- **Link to AcuCloud:** Opens the AcuCloud login page in the default web browser. An AcuCloud account is required. Contact Mod-Tronic if an account has not yet been issued.
- **Test Communication:** Verifies that the meter can reach the AcuCloud server using the configured token, allowing connectivity and authentication to be confirmed before leaving the website.
- **Clear AcuCloud Post Log:** Erases the record of upload attempts stored on the meter.

Setup Procedure

1. Set the **Enable** toggle to **ON.**
2. Click **Copy** to duplicate the meter's serial number.
3. Click **Link to AcuCloud** and log in to the platform, then register the device using the copied serial number.
4. Copy the token generated by AcuCloud and paste it into the **Token** field.
5. Click **Update** to write the settings to the meter.
6. Click **Test Communication** to confirm the meter is communicating with the platform.

Uploaded Data

The dataset pushed to AcuCloud is fixed and cannot be modified. All values are derived from the 10/12-cycle measurement algorithm.

Table 5-49 AcuCloud Data

Group	Parameters
Line-to-Neutral Voltage	Va, Vb, Vc, Vavg
Line-to-Line Voltage	Vab, Vbc, Vca, Vavg
Current	Ia, Ib, Ic, In, Iavg
Power	P, Q, S, PF
Frequency	System Frequency
Unbalance	Voltage Unbalance Current Unbalance
Voltage THD	THD Va, THD Vb, THD Vc
Current THD	THD Ia, THD Ib, THD Ic
Energy	Ep, Eq, Es

5.4.11 Data Post

Data Post

The Data Post function uploads recorded data log files to a user-defined server over HTTP or HTTPS, allowing logged data to be delivered directly into a third-party system without polling the meter.

Navigate to **Setting → Data** Post to configure the function. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

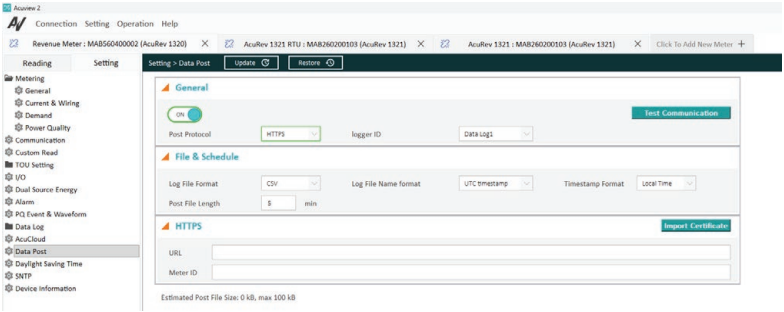


Figure 5-32 Data Post Settings

Table 5-50 Data Post General Setting Description

Field	Description	Options
Enable	Set Toggle to ON to Activate Data Posting	ON / OFF
Post Protocol	Protocol used to Transmit File where HTTPS Encrypts the Transfer and is Recommended for Supporting Destination Server	HTTP, HTTPS
Logger ID	Data Logger used as Source of Posted Data where Only One Logger can be Selected	Data Log1, Data Log2, Data Log3, Trend Log

Click **Test Communication** to verify that the meter can reach the destination server using the configured protocol and URL. This confirms the physical communication path before the first scheduled post is due.

INFO

When **HTTPS** is selected, a valid certificate must be installed on the meter before data can be posted. Without it, the connection to the destination server will fail and **Test Communication** will return an error. Click on **Import Certificate** to upload the certificate file.

Table 5-51 File & Schedule Setting Description

Field	Description	Options / Range
Log File Format	Format of Posted File Select Format Expected by Receiving System	CSV, JSON
Post File Length	Period of Logged Data Contained in Each Posted File in Minutes Meter Accumulates Records for this Duration and Transmits Records as a Single File	1 - 43200 Minutes
Log File Name Format	Naming of the Posted File, either by the UTC Timestamp at which the File was created or by the Logging Interval the File Covers	Time Interval Based UTC Timestamp
Timestamp Format	Format of Timestamps Written Inside the File	Local Time UTC Seconds ISO8601 Format

Post File Length and Logging Interval

The **Post File Length** must be greater than or equal to the logging interval configured for the selected source logger, so that each posted file contains at least one complete record. If a shorter value is entered, the meter rejects the configuration and displays the message:

Data Post File Length must be greater than or equal to Data Log Interval.

The message names the logger currently selected as the post source. To resolve it, either increase the **Post File Length** on this page, or reduce the logging interval for that logger under **Setting → Data Log.**

HTTP / HTTPS

Table 5-52 Protocol Description

Field	Description
URL	Full address of Destination server that Receives Posted Files
Meter ID	Identifier Included with Each Post that Allows Receiving System to Distinguish Between Multiple Meters

Post File Size Limit

Each posted file is limited to a maximum of **100 kB.** The estimated size of the next file is displayed at the bottom of the page as **Estimated Post File Size: xxx kB, max 100 kB,** and updates as the configuration is changed.

The file size depends on three settings, spread across the Data Log and Data Post pages:

- The number of parameters selected in the source data logger.
- The logging interval configured for that logger.
- The **Post File Length**.

If **Update** is clicked while the estimate is over the limit, the configuration is rejected and cannot be saved.

To bring the estimated file size within the limit, apply any of the following:

- Reduce the number of parameters selected in the source data logger.
- Increase the logging interval so fewer records are generated per file.
- Shorten the **Post File Length** so each file covers a shorter period.

> **INFO** The **Post File Length** is constrained from both directions. It must be long enough to contain at least one logging interval, but short enough to keep the resulting file under 100 kB. If both limits cannot be satisfied at once, reduce the number of parameters selected in the source logger to lower the size of each record.

5.4.12 Daylight Saving Time

The Daylight-Saving Time (DST) function automatically adjusts the meter's clock at the start and end of the daylight-saving period.

Navigate to **Setting → Daylight Saving Time** to configure the function. Set the toggle to **ON** to enable DST, then select the required **DST Format.** Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

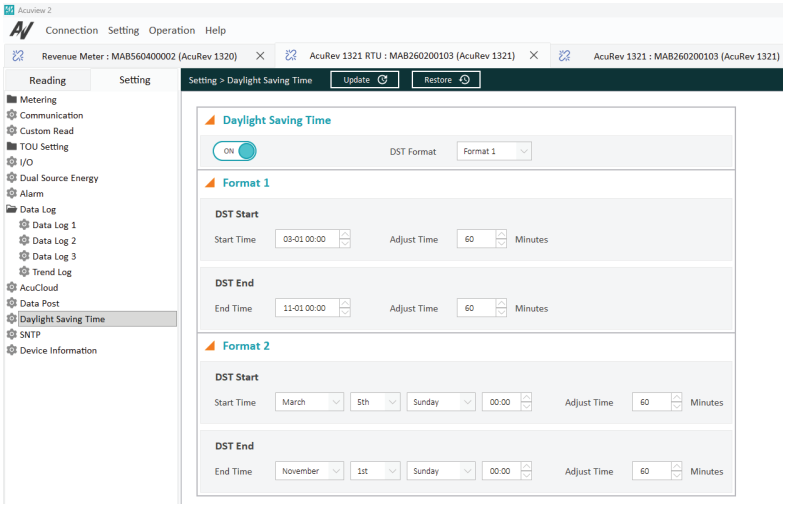


Figure 5-33 Daylight Saving Time Settings

DST Format

Two formats are available. Only the panel corresponding to the selected format is applied and the other is ignored.

Table 5-53 Format Description

Format	Definition	Use Case
Format 1	Fixed Calendar Date Entered as **MM-DD HH:MM**	Regions where DST Begins and Ends On Same Calendar Date Each Year
Format 2	Relative Date Defined by Month, Day of the Week, Week of the Month, and Time	Regions where DST Begins and Ends on Nominated Weekday, Such as the Second Sunday in March

Table 5-54 Format 1 Description

Field	Description	Example
DST Start - Start Time	Date and Time at which DST Begins Entered as **MM-DD HH:MM**	03-01 00:00
DST Start - Adjust Time	Number of Minutes Clock Advances when DST Begins Range: 1 - 120 Minutes Default: 60	60
DST End - End Time	Date and Time at which DST Ends Entered as **MM-DD HH:MM**	11-01 00:00
DST End - Adjust Time	Number of Minutes Clock Sets Back when DST Ends Range: 1 - 120 Minutes Default: 60	60

Table 5-55 Format 2 Description

Field	Description	Options	Example
Month	Month in which the Change Occurs	January - December	March
Week	Occurrence of Selected Day within Selected Month	1st, 2nd, 3rd, 4th, 5th	2nd
Day	Day of the Week on which Change Occurs	Monday -Sunday	Sunday
Time	HH:MM Formatted Time of Day at which the Change Takes Effect	00:00–23:59	00:00
Adjust Time	Number of minutes Clock Advances at Start of DST, or Set Back at the End. Range: 1 - 120 Minutes Default: 60	1–120	60

The start and end points are each defined by four dropdowns, read left to right.

The example configuration shown in the figure implies DST beginning on the second Sunday in March and ending on the first Sunday in November, each with a 60-minute adjustment that corresponds to the daylight-saving period observed across most of North America.

INFO Select **5th** to schedule the change on the last occurrence of the selected day in the month. This is required for regions such as the European Union, where DST ends on the last Sunday in October.

INFO Set the **Adjust Time** to the same value for both the start and end of DST. Using different values causes the clock to drift by the difference each year.

INFO

The DST adjustment shifts the meter's local time, which affects timestamps applied to newly recorded data. Records already stored retain the timestamps applied when they were logged.

5.4.13 SNTP

The Simple Network Time Protocol (SNTP) function synchronises the meter's internal clock with a network time server, keeping timestamps in data logs, event logs, and TOU billing accurate without manual intervention.

Navigate to **Setting → SNTP** to configure the function. Set the toggle to **ON** to enable synchronisation. Click **Update** to write the settings to the meter or **Restore** to reload the settings currently stored in the meter.

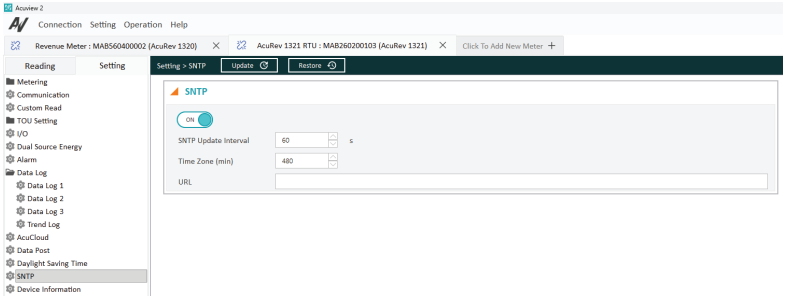


Figure 5-34 SNTP Settings

Table 5-56 SNTP Description

Field	Description	Range
SNTP Update Interval	Time between Synchronisation Requests measured in seconds Shorter Interval Keeps the Clock More Tightly Aligned but Generates More Network Traffic	60 - 4,294,967 s
Time Zone (min)	Local Offset from UTC which is Expressed in Minutes Positive Values East of UTC Negative Values West of UTC	−720 to +840 Min
URL	Address of SNTP Time Server	Maximum 40 Characters

Time Zone Offset

The offset is entered in minutes rather than hours, which allows regions with fractional-hour offsets to be configured accurately. Multiply the UTC offset in hours by 60 to obtain the value.

Table 5-57 Time Zone Offset Description

Time Zone	UTC Offset	Value to Enter
Eastern Standard Time (EST)	UTC - 5	– 300
Central European Time (CET)	UTC + 1	60
India Standard Time (IST)	UTC + 5:30	330
China Standard Time (CST)	UTC + 8	480

INFO

Enter the standard-time offset for the region, not the daylight-saving offset. Seasonal adjustment is handled separately by the Daylight-Saving Time function as seen in Section 5.4.12, Daylight Saving Time. Applying the offset in both places will shift the clock twice.

INFO

The meter must be able to reach the configured time server over the network. If the meter is on an isolated network, use a local time server address rather than a public one, and confirm that any firewall between the meter and the server permits SNTP traffic.

5.4.14 Device Information

The **Device Information** page displays the identification and version details of the connected meter. All fields are read-only and are populated directly from the device.

Navigate to **Setting → Device Information** to view the details. Click **Save To File** to export the information in .csv format for record-keeping or to include with a support enquiry.

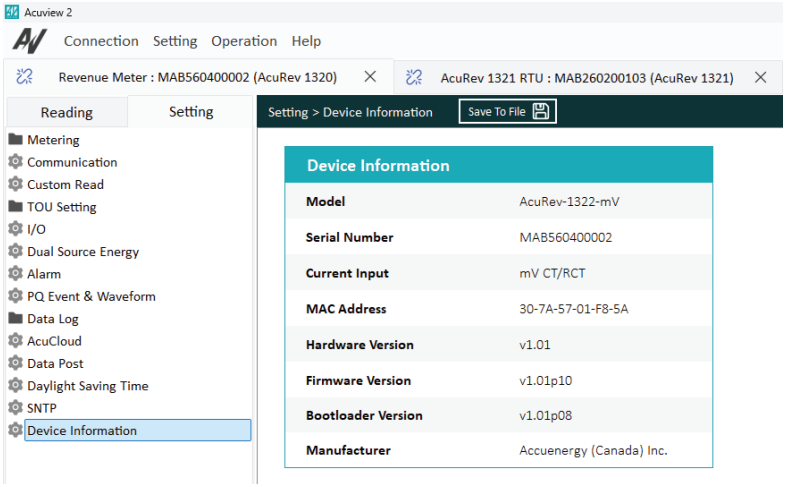


Figure 5-35 Device Information

Table 5-58 Device Information Description

Field	Description
Model	Model Designation of the Meter Including the Current Input Variant For Example: **AcuRev-1322-mV**
Serial Number	Unique Serial Number Assigned to the Meter Serial Number is also used to register the device on AcuCloud
Current Input	Type of Current Input the Meter Accepts For Example: **mV CT/RCT or mA CT**
MAC Address	Hardware Address Of Meter's Ethernet Interface
Hardware Version	Hardware Revision of the Meter
Firmware Version	Version of Firmware Currently Running on the Meter
Bootloader Version	Version of Bootloader Currently Installed
Manufacturer	Accuenergy (Canada) Inc.

INFO

Confirm that the **Current Input** field matches the current transformers installed before energising the system. Connecting mV (Rogowski or voltage-output) CT to a meter built for mA inputs, or the reverse, will produce incorrect measurements and may damage the meter.

INFO Be prepared with the model, serial number, and firmware version available when contacting technical support. Clicking **Save To File** captures all the information in a single file that can be attached to a support request.

5.5 Reading

Display Modes

Several pages under the Reading menu change layout depending on whether the **Independent Input Channel** function is enabled under **Setting → Metering → Current & Wiring:**

- **General display** is used when independent input channels are disabled. Measurements are presented per phase, in the conventional Phase A / Phase B / Phase C arrangement.
- **Independent mode display** is used when independent input channels are enabled. Each of the four current inputs can be paired with any voltage input, so any measurement derived from current is reported per channel rather than per phase.

The pages affected are **Real-Time, Energy, Demand,** and **Max Demand.** Voltage and frequency measurements remain phase-based in both modes, since that measurements are independent of the channel pairing.

5.5.1 Real-time

The **Real-Time** page displays live measurements of voltage, current, frequency, power, and power factor. Navigate to **Reading → Real-Time** to view the data. The layout of this page depends on the display mode in use as described.

The **Update Rate** control and the **Save To File** function operates identically in both modes.

INFO Every page under the Reading menu provides a **Save To File** button which allows the displayed data to be exported at any time.

Update Rate

The Update Rate dropdown selects the measurement aggregation used for the displayed values. Faster rates show instantaneous behaviour, while longer aggregations smooth short-term fluctuations and are better suited to assessing steady-state conditions.

INFO AcuRev-1321 models are limited to 10/12 Cycle update rate.

Table 5-59 Update Rate Description

Update Rate	Description
1 Cycle	Values Updated Every Cycle
10/12 Cycle	Values Aggregated Over 10 Cycles at 50 Hz or 12 Cycles at 60 Hz Approximately 200 ms
150/180 Cycle	Values Aggregated Over 150 Cycles at 50 Hz or 180 Cycles at 60 Hz Approximately 3 s
10min Aggregation	Values Aggregated Over 10 Minutes
2hr Aggregation	Values Aggregated Over 2 Hours
Moving Average	Values Averaged Over the Number of Cycles Set by **Moving Average Window (Cycles) under Setting → Metering → General → Advanced**

General Display

When independent input channels are disabled, all measurements are shown in a single **System** table, with columns for **Phase A, Phase B, Phase C, Average,** and **System.** A dash (–) indicates that the parameter does not apply to that column.

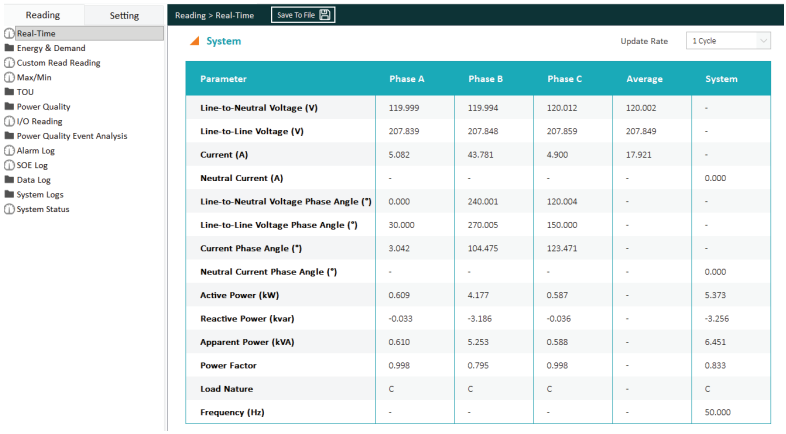


Figure 5-36 General Real-Time Reading Display

Table 5-60 General Mode Description

Parameter	Description
Line-to-Neutral Voltage (V)	Phase Voltage Measured Between Each Line and Neutral
Line-to-Line Voltage (V)	Voltage Measured Between Phase Pairs
Current (A)	Phase Current

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Parameter	Description
Neutral Current (A)	Current in the Neutral Conductor Shown as a System Value
Line-to-Neutral Voltage Phase Angle (°)	Phase Angle of Each Line-to-Neutral Voltage Referenced to Va
Line-to-Line Voltage Phase Angle (°)	Phase Angle of Each Line-to-Line Voltage
Current Phase Angle (°)	Phase Angle of Each Phase Current
Neutral Current Phase Angle (°)	Phase Angle of the Neutral Current
Active Power (kW)	Real Power per Phase and System Total
Reactive Power (kvar)	Reactive Power per Phase and System Total
Apparent Power (kVA)	Apparent Power per Phase and System Total
Power Factor	Ratio of Active to Apparent Power
Load Nature	Character of the load **C** for Capacitive **L** for Inductive **R** for Resistive
Frequency (Hz)	System Frequency

INFO

The **Average** column shows the mean of phases A, B, and C.

The **System** column shows the total across all phases for power quantities, or the single system-wide value for parameters such as frequency and neutral current.

Independent Mode Display

When the **Independent Input Channel** function is enabled, each of the four current inputs can be paired with any voltage input, so measurements that depend on current are reported per channel rather than per phase. The page is divided into three panels.

Independent Wiring Mode Setting

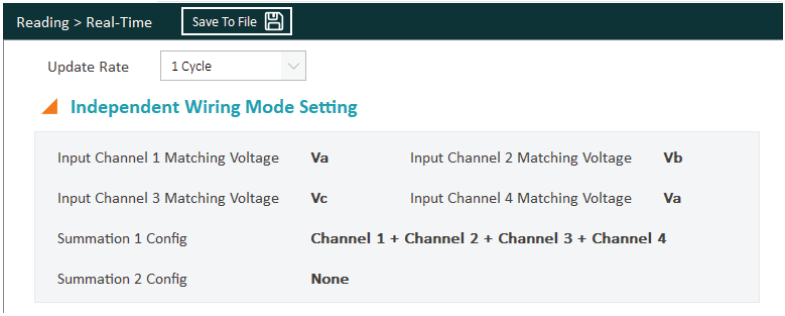


Figure 5-37 Independent Mode Display

This read-only panel confirms how the channels are configured:

Table 5-61 Independent Mode Configuration

Field	Description
Input Channel 1 - 4 Matching Voltage	Voltage Input Paired with Each Current Channel Va, Vb, Vc, Vab, Vbc, or Vca as configured under **Setting → Metering → Current & Wiring**
Summation 1 Config	Channels Combined into the Summation 1 Result For Example: **Channel 1 + Channel 2 + Channel 3 + Channel 4**
Summation 2 Config	Channels Combined into the Summation 2 Result, or **None** if Not Configured

Voltage

Voltage

Parameter	Phase A	Phase B	Phase C	Average	System
Line-to-Neutral Voltage (V)	120.009	120.024	120.033	120.022	-
Line-to-Neutral Voltage Phase Angle (°)	0.000	240.002	120.002	-	-
Line-to-Line Voltage (V)	207.872	207.896	207.884	207.884	-
Line-to-Line Voltage Phase Angle (°)	30.003	270.003	149.997	-	-
Frequency (Hz)	-	-	-	-	49.999

Figure 5-38 Independent Mode Voltage Measurement

Voltage measurements remain phase-based, since voltages are independent of the channel pairing. The table shows Line-to-Neutral Voltage, Line-to-Line Voltage, respective Phase Angles, and system Frequency across the Phase A, Phase B, Phase C, Average, and System columns.

Current & Power

Current & Power

Parameter	Input Channel 1	Input Channel 2	Input Channel 3	Input Channel 4	Summation 1	Summation 2
Current (A)	5.057	5.039	4.903	0.000	3.753	0.000
Current Phase Angle (°)	3.046	243.228	123.366	0.000	-	-
Active Power (kW)	0.607	0.606	0.586	0.000	1.799	0.000
Reactive Power (kvar)	-0.032	-0.034	-0.034	0.000	-0.101	0.000
Apparent Power (kVA)	0.607	0.607	0.587	0.000	1.802	0.000
Power Factor	0.999	0.998	0.998	0.000	0.998	0.000
Load Nature	C	C	C	R	C	R

Figure 5-39 Independent Mode Current and Power Measurements

Current and power measurements are shown per channel, with columns for **Input Channel 1** through **Input Channel 4,** followed by **Summation 1** and **Summation 2.** The parameters listed are Current, Current Phase Angle, Active Power, Reactive Power, Apparent Power, Power Factor, and Load Nature.

The summation columns aggregate the channels defined in the Independent Wiring Mode Setting panel, allowing a group of channels to be reported as a single combined load.

Phase angle is not applicable to a summation and is shown as a dash.

Phase Angle Diagram

A phasor diagram is displayed at the bottom of the page in both modes, showing the relative angular position of each voltage and current. The title indicates the active wiring configuration, for example: **Phase Angles (3 Element 4 Wire Y),** and the legend lists the measured angle of each quantity.

In general display mode the legend identifies currents by phase Ia, Ib, Ic.

In independent mode it identifies the legends by channel I1, I2, I3, I4.

The diagram is a useful commissioning aid as the balanced three-phase voltages appear as three vectors separated by approximately 120°. The angular displacement between each voltage and its associated current indicates the power factor. A current vector that is displaced by roughly 180° from its expected position generally indicates a reversed CT connection.

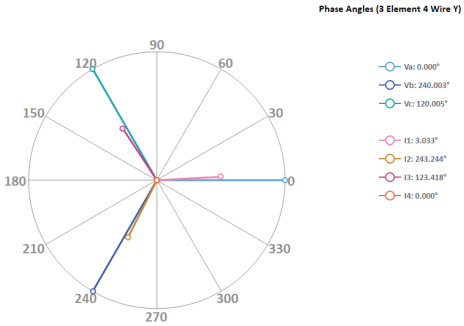
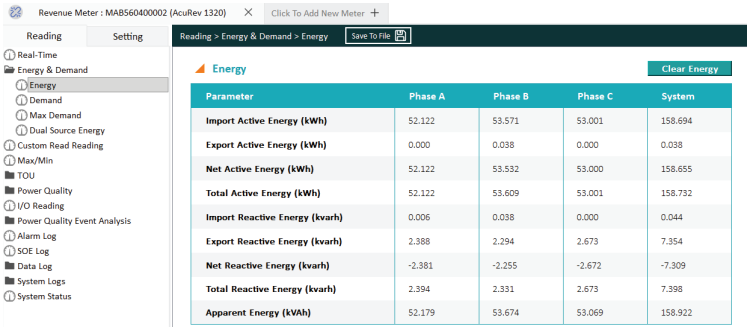


Figure 5-40 Phase Angle Diagram

5.5.2 Energy & Demand

5.5.2.1 Energy

The **Energy** page displays accumulated energy readings for the circuits connected to the meter. It is reported in double-precision format and is displayed to three decimal places. The display resolution is fixed. Navigate to **Reading → Energy & Demand → Energy** to view the data.



Parameter	Phase A	Phase B	Phase C	System
Import Active Energy (kWh)	52.122	53.571	53.001	158.694
Export Active Energy (kWh)	0.000	0.038	0.000	0.038
Net Active Energy (kWh)	52.122	53.532	53.000	158.655
Total Active Energy (kWh)	52.122	53.609	53.001	158.732
Import Reactive Energy (kvarh)	0.006	0.038	0.000	0.044
Export Reactive Energy (kvarh)	2.388	2.294	2.673	7.354
Net Reactive Energy (kvarh)	-2.381	-2.255	-2.672	-7.309
Total Reactive Energy (kvarh)	2.394	2.331	2.673	7.398
Apparent Energy (kVAh)	52.179	53.674	53.069	158.922

Figure 5-41 Energy Readings

Energy

The upper panel shows total accumulated active, reactive, and apparent energy, presented per phase and as a system total.

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Table 5-62 Energy Panel Description

Parameter	Description
Import Active Energy (kWh)	Active Energy Delivered to the Load
Export Active Energy (kWh)	Active Energy Returned to the Source
Net Active Energy (kWh)	Import Minus Export
Total Active Energy (kWh)	Import Plus Export
Import Reactive Energy (kvarh)	Reactive Energy Delivered to the Load
Export Reactive Energy (kvarh)	Reactive Energy Returned to the Source
Net Reactive Energy (kvarh)	Import - Export
Total Reactive Energy (kvarh)	Import + Export
Apparent Energy (kVAh)	Accumulated Apparent Energy

Net values may be negative, indicating that export exceeds import over the accumulation period. This is normal on circuits with on-site generation, and on the reactive channel for predominantly capacitive loads.

Click **Clear Energy** to erase the accumulated energy data.

INFO

Cleared energy data cannot be recovered.

On a sealed revenue meter, this function is unavailable.

Four-Quadrant Energy

The lower panel resolves the same accumulated energy into four quadrants, defined by the direction of active power on the horizontal axis and reactive power on the vertical axis. This allows consumption and generation to be distinguished, and inductive behaviour separated from capacitive behaviour, from a single measurement point.

Table 5-63 Quadrant Energy Panel Description

Quadrant	Active Power	Reactive Power	Condition	Load Type
First	Import (+)	Import (+)	Consuming	Inductive
Second	Export (−)	Import (+)	Generating	Capacitive
Third	Export (−)	Export (−)	Generating	Inductive
Fourth	Import (+)	Export (−)	Consuming	Capacitive

Active, reactive, and apparent energy are each accumulated separately in all four quadrants, giving

twelve values per phase:

- Active Energy First to Fourth Quadrant (kWh)
- Reactive Energy First to Fourth Quadrant (kvarh)
- Apparent Energy First to Fourth Quadrant (kVAh)

Four-Quadrant Energy

Parameter	Phase A	Phase B	Phase C	System
Active Energy First Quadrant (kWh)	0.018	0.003	0.001	0.022
Active Energy Second Quadrant (kWh)	0.000	0.038	0.000	0.038
Active Energy Third Quadrant (kWh)	0.000	0.000	0.000	0.000
Active Energy Fourth Quadrant (kWh)	52.133	53.596	53.028	158.757
Reactive Energy First Quadrant (kvarh)	0.006	0.002	0.000	0.008
Reactive Energy Second Quadrant (kvarh)	0.000	0.036	0.000	0.036
Reactive Energy Third Quadrant (kvarh)	0.000	0.000	0.000	0.000
Reactive Energy Fourth Quadrant (kvarh)	2.389	2.295	2.674	7.358
Apparent Energy First Quadrant (kVAh)	0.020	0.005	0.001	0.025
Apparent Energy Second Quadrant (kVAh)	0.000	0.053	0.000	0.053
Apparent Energy Third Quadrant (kVAh)	0.000	0.000	0.000	0.000
Apparent Energy Fourth Quadrant (kVAh)	52.188	53.645	53.096	158.928

Figure 5-42 Four-Quadrant Energy Readings

INFO

The quadrant distribution is a useful commissioning check. A load expected to be inductive that accumulates predominantly in the fourth quadrant, or a circuit with no generation showing significant second- or third-quadrant energy, generally indicates a reversed CT connection or an incorrect voltage-to-current pairing. Verify the wiring against the phasor diagram on the **Real-Time** page.

5.5.2.2 Demand

The **Demand** page displays the present demand values for current and power, together with a predicted demand for the interval in progress.

Navigate to **Reading → Energy & Demand → Demand** to view the data.

Demand is the average of a measured quantity over a defined interval, rather than an instantaneous value. It is the basis on which demand charges are usually billed, since it reflects sustained loading rather than momentary peaks. The demand interval and calculation method are configured under **Setting → Metering → Demand.**

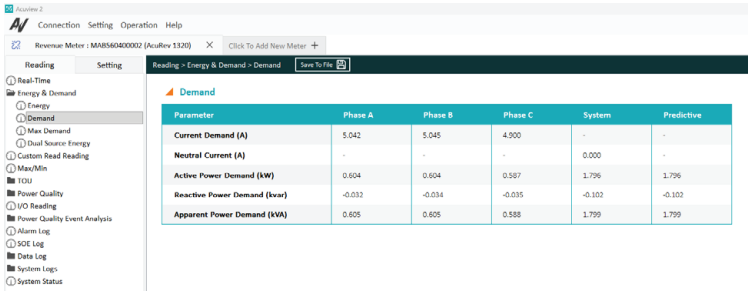


Figure 5-43 Demand Readings

Values are presented per phase, as a **System** total, and as a **Predictive** value. A dash (–) indicates that the parameter does not apply to that column.

Table 5-64 Demand Description

Parameter	Description
Current Demand (A)	Per Phase Average Current over Demand Interval
Neutral Current (A)	Average Neutral Current over Demand Interval Shown as a System Value
Active Power Demand (kW)	Average Active Power over Demand Interval
Reactive Power Demand (kvar)	Average Reactive Power over Demand Interval
Apparent Power Demand (kVA)	Average Apparent Power over Demand Interval

Predictive Demand

The **Predictive** column shows the demand the meter expects to record by the end of the interval currently in progress, based on consumption so far. The prediction updates every second, allowing a rising demand to be identified and load shed before the interval closes and the peak is registered.

Predictive demand is provided for the three power quantities only. It is not calculated for current demand or neutral current, which are shown as a dash.

> **INFO** Early in a demand interval the prediction is based on a small proportion of the interval and will fluctuate. It becomes progressively more accurate as the interval advances.

The highest demand values recorded, together with the time at which each occurred, are retained on the **Max Demand** page. See Max Demand below.

5.5.2.3 Max Demand

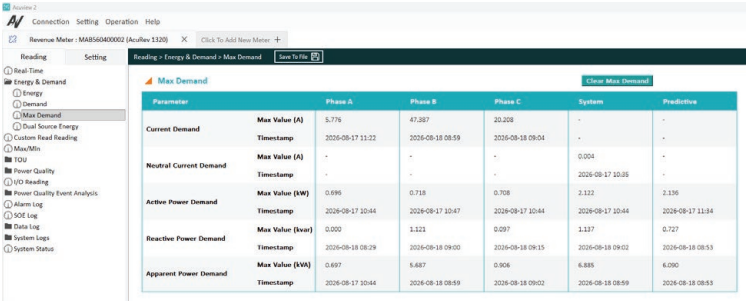


Figure 5-44 Max Demand Readings

The Max Demand page records the highest demand value reached for each parameter, together with the date and time at which it occurred.

Navigate to **Reading → Energy & Demand → Max Demand** to view the data.

Maximum demand is retained until it is exceeded by a higher value or manually cleared, making it the figure most used for demand billing and for assessing whether a supply is adequately rated.

Values are recorded for Current Demand, Neutral Current Demand, Active Power Demand, Reactive Power Demand, and Apparent Power Demand, each shown per phase, as a System total, and as a Predictive value. Every entry is accompanied by a timestamp indicating when the maximum was reached, so a peak can be traced back to the operating conditions that caused it. Where a parameter does not apply to a column, such as neutral current on the individual phases, a dash is displayed.

Maximum demand values update at the same rate as the demand calculation itself, so a new maximum is registered only at the close of a demand interval in which the previous peak was exceeded.

Click **Clear Max Demand** to erase the recorded maximum values and respective timestamps.

> **INFO** Cleared maximum demand data cannot be recovered.

Each time the maximum demand is cleared, the meter records the event. The total number of resets and the time of the most recent one are shown as **Max Demand Reset Count** and **Last Max Demand Reset Time** under **Setting → Metering → Demand.**

5.5.2.4 Dual Source Energy

The **Dual Source Energy** page displays energy accumulated separately for each of the two supply sources, along with a log of every switchover between the source.

Navigate to **Reading → Energy & Demand → Dual Source Energy** to view the data.

This function is intended for installations supplied by both the utility grid and on-site generation, such as photovoltaic equipment. It allows consumption drawn from each source to be reported independently from a single measurement point. The energy parameters shown here, and the method by which the meter is told which source is active, are configured under **Setting → Dual Source Energy.**

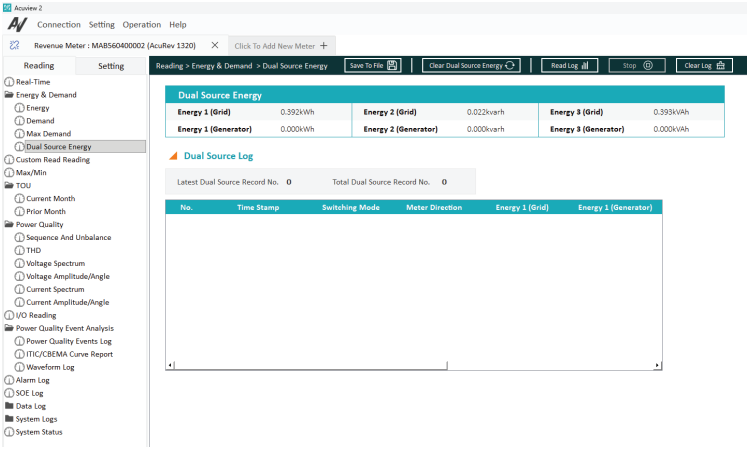


Figure 5-45 Dual Source Energy Readings

Dual Source Energy

The upper panel shows the accumulated total for each of the three configured energy parameters which is split by source.

- **Energy 1 (Grid)** and **Energy 1 (Generator)**
- **Energy 2 (Grid)** and **Energy 2 (Generator)**
- **Energy 3 (Grid)** and **Energy 3 (Generator)**

The unit displayed beside each value reflects the parameter assigned to that slot in the settings as kWh for active energy, kvarh for reactive energy, or kVAh for apparent energy. If a slot is set to **Undefined,** no value is accumulated.

INFO

Dual source energy registers are accumulated at a resolution of 0.1 kWh, unlike the system energy registers, which are accumulated in double-precision format at 0.001 kWh. The grid and generation totals for a parameter will therefore not sum exactly to the corresponding system energy reading. A residual difference of this order is expected and does not indicate a measurement error.

Click **Clear Dual Source Energy** to erase the accumulated totals.

INFO

Cleared dual source energy data cannot be recovered.

Dual Source Log

The lower panel records every switchover between sources, providing an audit trail of when the meter changed the source to which energy was attributed.

Two summary fields are shown above the table as **Latest Dual Source Record No.** that identifies the most recent entry, and **Total Dual Source Record No.** gives the number of records currently stored.

Each log entry contains the record number, the timestamp of the switchover, the switching mode in effect at the time, the meter direction after the change, and the accumulated grid and generator values for each energy parameter at that moment.

The conditions that generate a log entry depend on the switching mode. In **Comm.** mode an entry is written each time the direction is changed over communications, while in **DI 1** to **DI 3** mode an entry is written on each transition of the assigned digital input.

The following controls are available.

- **Read Log** is used to retrieve the stored log records from the meter and populates the table.
- **Stop** will halt an in-progress read, which is useful when a large number of records is being retrieved over a slow connection.
- **Clear Log** erases the stored log records.
- **Save To File** exports the displayed data.

INFO

Log records are not displayed until **Read Log** is clicked.

5.5.3 Custom Read Reading

The Custom Read Reading page displays the live value of each parameter selected in the Custom Read configuration. Navigate to **Reading → Custom Read Reading** to view the data.

Custom Read allows a set of measurement parameters to be grouped into a single contiguous block of registers, so that a master device can retrieve all of the registers in one Modbus transaction rather than issuing a separate request for each. The page reflects configuration under **Setting → Custom Read,** giving a convenient way to confirm the block is returning the expected values before a control system is pointed at it.

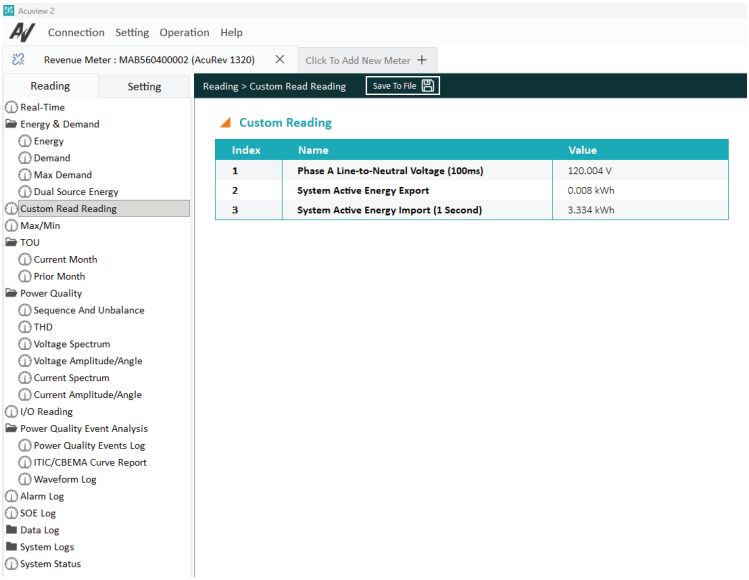


Figure 5-46 Custom Read Reading

The table lists each configured parameter with its position in the block:

- **Index:** Position of the parameter within the custom read block which is numbered from 1.
- **Name:** Parameter name including its update rate where applicable.
- **Value:** Present value with unit.

Parameters appear in the order of its addition to the **Custom Reading Table** in the settings page, and the index corresponds to that order. Adding, removing, or reordering parameters under **Setting → Custom Read** changes what appears here.

If no parameters have been configured, the table is empty.

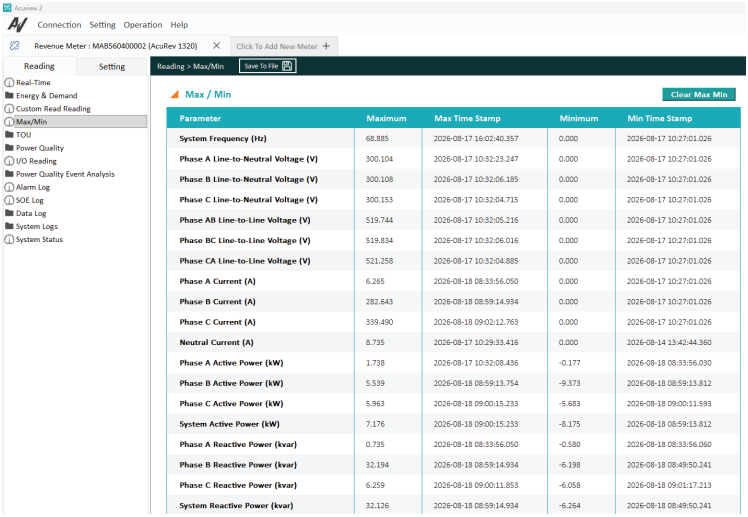
Click **Save To File** to export the displayed values.

> **INFO**
>
> The index shown on this page is the sequential position within the block, not the Modbus register address. The register address assigned to each parameter is shown alongside its name in the **Custom Reading Table** under **Setting → Custom Read.**
>
> For example: **3002H – Phase A Line-to-Neutral Voltage (100ms).**
>
> Use the addresses when configuring a master device to read the block.

5.5.4 Max/Min

The **Max/Min** page records the highest and lowest value reached by each monitored parameter since the page was last cleared, together with the time at which each occurred. Navigate to **Reading → Max/Min** to view the data.

Unlike the Max Demand page, which records averaged values over a demand interval, Max/Min captures instantaneous extremes. This makes it useful for identifying transient conditions, a voltage excursion, a current surge, or a brief power factor collapse, that would be smoothed out of a demand calculation.



Parameter	Maximum	Max Time Stamp	Minimum	Min Time Stamp
System Frequency (Hz)	68.885	2026-08-17 16:02:40.357	0.000	2026-08-17 10:27:01.026
Phase A Line-to-Neutral Voltage (V)	300.104	2026-08-17 10:32:23.247	0.000	2026-08-17 10:27:01.026
Phase B Line-to-Neutral Voltage (V)	300.108	2026-08-17 10:32:06.185	0.000	2026-08-17 10:27:01.026
Phase C Line-to-Neutral Voltage (V)	300.153	2026-08-17 10:32:04.715	0.000	2026-08-17 10:27:01.026
Phase AB Line-to-Line Voltage (V)	519.744	2026-08-17 10:32:05.216	0.000	2026-08-17 10:27:01.026
Phase BC Line-to-Line Voltage (V)	519.834	2026-08-17 10:32:06.016	0.000	2026-08-17 10:27:01.026
Phase CA Line-to-Line Voltage (V)	521.258	2026-08-17 10:32:04.885	0.000	2026-08-17 10:27:01.026
Phase A Current (A)	6.265	2026-08-18 08:33:56.050	0.000	2026-08-17 10:27:01.026
Phase B Current (A)	282.643	2026-08-18 08:59:14.934	0.000	2026-08-17 10:27:01.026
Phase C Current (A)	339.490	2026-08-18 09:02:12.763	0.000	2026-08-17 10:27:01.026
Neutral Current (A)	8.735	2026-08-17 10:29:33.416	0.000	2026-08-14 13:42:44.360
Phase A Active Power (kW)	1.738	2026-08-17 10:32:08.436	-0.177	2026-08-18 08:33:56.030
Phase B Active Power (kW)	5.539	2026-08-18 08:59:13.754	-9.373	2026-08-18 08:59:13.812
Phase C Active Power (kW)	5.963	2026-08-18 09:00:15.233	-5.683	2026-08-18 09:00:11.593
System Active Power (kW)	7.176	2026-08-18 09:00:15.233	-8.175	2026-08-18 08:59:13.812
Phase A Reactive Power (kvar)	0.735	2026-08-18 08:33:56.050	-0.580	2026-08-18 08:33:56.060
Phase B Reactive Power (kvar)	32.194	2026-08-18 08:59:14.934	-6.198	2026-08-18 08:49:50.241
Phase C Reactive Power (kvar)	6.259	2026-08-18 09:00:11.853	-6.058	2026-08-18 09:01:17.213
System Reactive Power (kvar)	32.126	2026-08-18 08:59:14.934	-6.264	2026-08-18 08:49:50.241

Figure 5-47 Max/Min Readings

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Each row shows the parameter name, its **Maximum** value with a **Max Time Stamp,** and its **Minimum** value with a **Min Time Stamp.** Timestamps are recorded to millisecond resolution, allowing an extreme to be correlated against entries in the alarm log, SOE log, or a captured waveform.

The parameters recorded are System Frequency, Per Phase Line-To-Neutral Voltage, Per Phase Pair Line-To-Line Voltage, Per Phase Current, Neutral Current, Per Phase Active, Reactive, And Apparent Power, and System, Per Phase Power Factor, Per Phase and System, Negative-Sequence Voltage and Current Unbalance, Per Phase Voltage THD, Per Phase Current THD, And Neutral Current THD.

Values that can be bidirectional, active power, reactive power, and power factor, may record a negative minimum, reflecting export or a leading power factor rather than an absence of measurement.

Click **Clear Max Min** to erase all recorded extremes and their timestamps.

INFO

Cleared max/min data cannot be recovered.

INFO

Max/min values are captured from instantaneous measurements and will therefore record brief excursions, including occurrance during energization, switching, or maintenance.

Clear the page after commissioning so that the recorded extremes reflect normal operating conditions.

5.5.5 TOU

The **TOU** pages display energy and maximum demand accumulated separately into each configured tariff, allowing consumption to be reported against the time-of-use calendar. Navigate to **Reading → TOU** to view the data.

Two pages are provided, presenting identical parameters for different billing periods.

- **Current Month:** Data accumulating in the billing period currently in progress.
- **Prior Month:** Data from the most recently closed billing period which is transferred automatically at the monthly billing point configured under **Setting → TOU Setting → TOU.** This page is read-only and provides no clear functions, preserving the closed period as a billing record.

Each page is divided into three panels. Values are shown per tariff as **Sharp, Peak, Valley,**

and Normal with a **Total** column. Only tariffs enabled in the TOU settings accumulate data and disabled tariffs display zero.

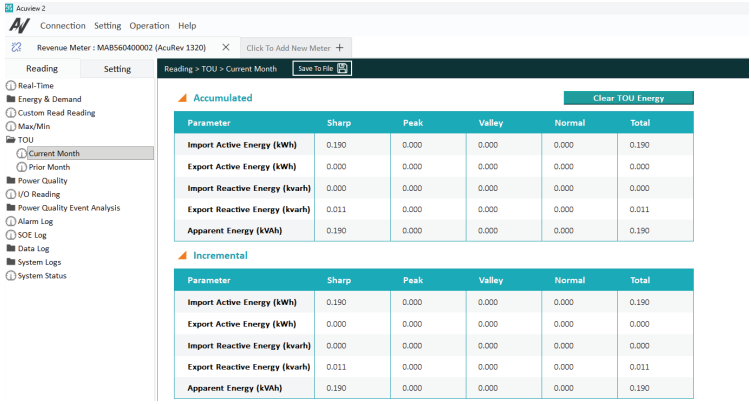


Figure 5-48 Current Month TOU Readings

Accumulated

Shows the running total of energy since the TOU registers was last cleared, carried forward across billing periods. Parameters recorded are Import and Export Active Energy (kWh), Import and Export Reactive Energy (kvarh), and Apparent Energy (kVAh).

Incremental

Shows the energy accumulated within the current billing period alone, reset at each monthly billing point. The same five parameters are recorded.

Comparing the two panels distinguishes lifetime consumption from consumption in the present period. On a newly commissioned meter, or a meter with recently cleared registers, the accumulated and incremental values will match until the first billing point passes.

INFO

TOU energy registers are accumulated at a resolution of 0.1 kWh, unlike the system energy registers, which are accumulated in double-precision format at 0.001 kWh. The sum of the TOU tariff values will therefore not match digit-for-digit with the corresponding system energy reading. A residual difference of this order is expected and does not indicate a measurement error.

Maximum Demand

Maximum Demand

Clear TOU Max Demand

Parameter	Sharp	Peak	Valley	Normal	Total
Import Active Power Demand (kW)	3.303 2026-08-01 08:59	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Export Active Power Demand (kW)	2.405 2026-08-01 08:59	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Import Reactive Power Demand (kvar)	4.388 2026-08-01 09:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Export Reactive Power Demand (kvar)	4.338 2026-08-01 08:59	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Apparent Power Demand (kVA)	6.885 2026-08-01 08:59	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Phase A Current Demand (A)	5.776 2026-08-01 11:22	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Phase B Current Demand (A)	47.387 2026-08-01 08:59	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00
Phase C Current Demand (A)	20.208 2026-08-01 09:04	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00	0.000 2024-01-01 00:00

Figure 5-49 TOU Maximum Demand

Shows the highest demand recorded in each tariff, with the date and time at which it occurred displayed beneath each value. Parameters recorded are Import and Export Active Power Demand (kW), Import and Export Reactive Power Demand (kvar), Apparent Power Demand (kVA), and Current Demand (A) for each phase.

Clearing TOU Data

Two controls are provided on the **Current Month** page:

- **Clear TOU Energy:** Erases the accumulated and incremental energy registers.
- **Clear TOU Max Demand:** Erases the recorded maximum demand values and respective timestamps.

> **INFO** Functions are available only while the meter is unsealed. Once the meter has been sealed for revenue metering, TOU data cannot be cleared. Cleared data cannot be recovered.

Click **Save To File** to export the displayed data in CSV format. This function is available on both pages.

> **INFO** A timestamp of **2024-01-01 00:00** against a zero value indicates that no demand has yet been recorded in that tariff, rather than an event occurring on that date. This is normal for tariffs that are not enabled or have not yet been active.

5.5.6 Power Quality

5.5.6.1 Sequence and Unbalance

The **Sequence and Unbalance** page resolves the three-phase voltage and current into respective symmetrical components and reports the resulting unbalance.

Navigate to **Reading → Power Quality → Sequence And Unbalance** to view the data.

Symmetrical component analysis decomposes an unbalanced three-phase system into three balanced sets, which makes it possible to quantify the degree and character of any imbalance from a single measurement point. This is a standard diagnostic for identifying phase loading problems, faulty connections, and conditions that cause overheating in rotating machinery.

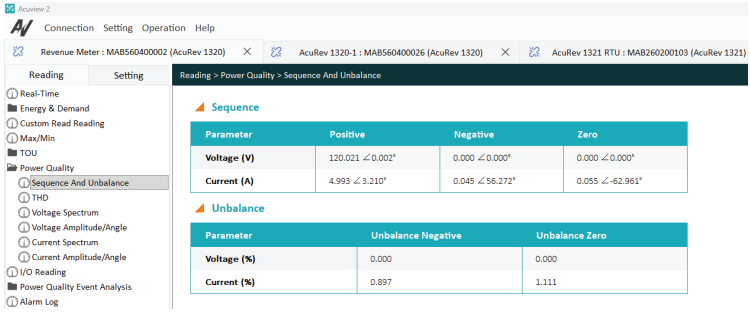


Figure 5-50 Sequence and Unbalance Readings

Sequence

The upper panel shows the magnitude and phase angle of each symmetrical component, for both voltage and current:

- **Positive:** Balanced component rotating in the normal phase sequence. This is the component that produces useful torque in a motor, and on a healthy system it accounts for essentially the entire measured quantity.
- **Negative:** Component rotating in the reverse sequence, present when the three phases are unequal in magnitude or unevenly spaced in angle. Negative-sequence current causes additional heating in motors and generators.
- **Zero:** Component that is identical in all three phases, present when current returns through the neutral or ground. It arises from unbalanced single-phase loading on a four-wire system and from earth faults.

Each value is shown as a magnitude followed by an angle in the form **0.000 ∠ 0.000°.**

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Unbalance

The lower panel expresses the unbalance as a percentage, calculated as the ratio of the negative- or zero-sequence component to the positive-sequence component.

- **Unbalance Negative (%):** Negative-sequence component as a percentage of positive sequence.
- **Unbalance Zero (%):** Zero-sequence component as a percentage of positive sequence.

Both are reported for voltage and current.

Phasor Diagram

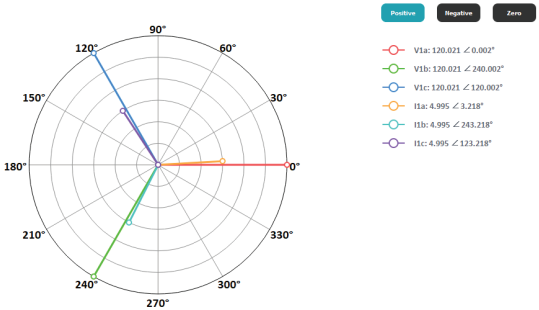


Figure 5-51 Positive Sequence Component Phasor Diagram

A phasor diagram at the bottom of the page displays the selected sequence component graphically. Use the **Positive, Negative,** and **Zero** buttons above the legend to switch between components. The diagram and legend update to show the three voltage phasors V1a, V1b, V1c and three current phasors I1a, I1b, I1c for the selected sequence.

For a balanced system, the positive-sequence view shows three voltage phasors of equal length separated by 120°, while the negative- and zero-sequence views show phasors of negligible magnitude.

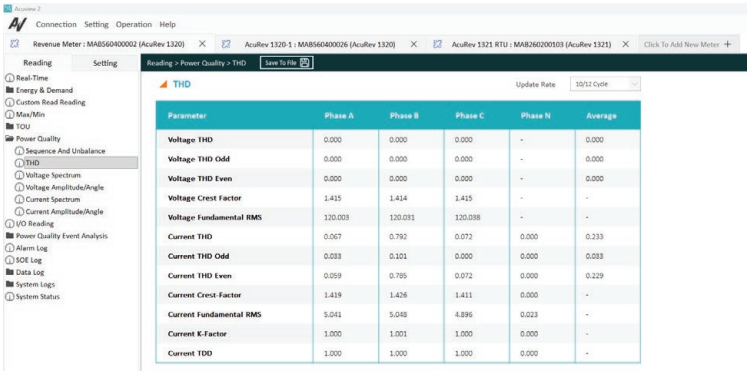
> **INFO** Sequence and unbalance calculations require all three voltage and current inputs to be connected. On single-phase or two-element installations, the values reported are not meaningful.

5.5.6.2 THD

The **THD** page reports harmonic distortion on the voltage and current inputs, along with related waveform quality indices.

Navigate to **Reading → Power Quality → THD** to view the data.

Total harmonic distortion expresses the combined magnitude of all harmonic components as a percentage of the fundamental.



Parameter	Phase A	Phase B	Phase C	Phase N	Average
Voltage THD	0.000	0.000	0.000	-	0.000
Voltage THD Odd	0.000	0.000	0.000	-	0.000
Voltage THD Even	0.000	0.000	0.000	-	0.000
Voltage Crest Factor	1.415	1.414	1.415	-	-
Voltage Fundamental RMS	120.003	120.031	120.038	-	-
Current THD	0.067	0.792	0.072	0.000	0.233
Current THD Odd	0.033	0.101	0.000	0.000	0.033
Current THD Even	0.059	0.785	0.072	0.000	0.229
Current Crest Factor	1.419	1.426	1.411	0.000	-
Current Fundamental RMS	5.041	5.048	4.896	0.023	-
Current K-Factor	1.000	1.001	1.000	0.000	-
Current TDD	1.000	1.000	1.000	0.000	-

Figure 5-52 THD Readings

Update Rate

The **Update Rate** dropdown selects the aggregation interval used for the displayed values.

Table 5-65 Update Rate Description

Update Rate	Description
10/12 Cycle	Aggregated over 10 Cycles at 50 Hz or 12 Cycles at 60 Hz Approximately 200 ms
150/180 Cycle	Aggregated over 150 Cycles at 50 Hz or 180 Cycles at 60 Hz Approximately 3 s
10min Aggregation	Aggregated over 10 minutes
2hr Aggregation	Aggregated over 2 hours

Shorter intervals reveal transient distortion while longer intervals are the basis for most compliance assessments, which are typically evaluated against 10-minute values.

In AcuRev-1321 models, the update rate is fixed at 10/12 cycles.

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Parameters

Values are shown for **Phase A, Phase B, Phase C, Phase N,** and **Average.** A dash (–) indicates that the parameter does not apply to that column.

Table 5-66 THD Description

Parameter	Description
Voltage THD	Fundamental Percentage of Total Voltage Harmonic Distortion
Voltage THD Odd	Distortion Contributed by Odd-Order Harmonics
Voltage THD Even	Distortion Contributed by Even-Order Harmonics
Voltage Crest Factor	Ratio of peak to RMS voltage A Pure Sine Wave Gives 1.414 and Lower Values Indicate a Flat-Topped Waveform, Typically Caused by Rectifier Loading
Voltage Fundamental RMS	RMS Magnitude of the Fundamental Voltage Component Excluding Harmonics
Current THD	Fundamental Percentage of Total Current Harmonic Distortion
Current THD Odd	Distortion Contributed by Odd-Order Harmonics
Current THD Even	Distortion Contributed by Even-Order Harmonics
Current Crest Factor	Ratio of Peak to RMS Current
Current Fundamental RMS	RMS Magnitude of the Fundamental Current Component alone
Current K-Factor	Weighted Index of Harmonic Heating Effect Used to Select Appropriately Rated Transformers A value of 1.0 indicates a Pure Sinusoidal Load
Current TDD	Total Demand Distortion Harmonic Current expressed as a Percentage of Maximum Demand Current rather than of the Present Fundamental

Separating odd and even distortion is diagnostically useful. The odd harmonics are characteristic of normal non-linear loads such as variable speed drives and switched-mode power supplies, whereas significant even-order content usually indicates asymmetric waveform distortion from a half-wave rectifier, an arcing fault, or a saturating transformer.

INFO THD is expressed relative to the fundamental, so at very low load the reported percentage can become large or erratic even when the absolute harmonic content is negligible. TDD, which references maximum demand current instead, gives a more stable indication under light loading and is the quantity used for IEEE 519 assessment.

Click **Save To File** to export the displayed values.

5.5.6.3 Voltage Spectrum

The **Voltage Spectrum** page displays the harmonic content of each phase voltage as a bar chart, showing the magnitude of each harmonic order.

Navigate to **Reading → Power Quality → Voltage Spectrum** to view the data.

THD page reduces harmonic content to a single percentage and the spectrum shows the distribution across individual orders. This identifies which harmonics are dominant, which in turn indicates the type of load responsible. Six-pulse drives produce characteristic 5th and 7th harmonics, while single-phase switched-mode supplies concentrate energy in the 3rd.

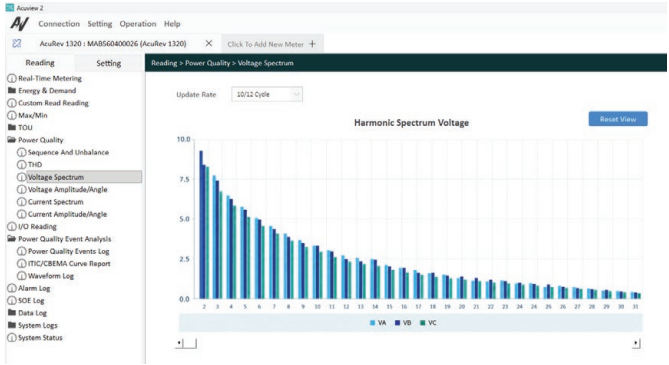


Figure 5-53 Voltage Harmonic Spectrum

Update Rate

The **Update Rate** dropdown selects the aggregation interval used for the displayed values, offering the same options as the THD page such as **10/12 Cycle, 150/180 Cycle, 10min Aggregation,** and **2hr Aggregation.** In AcuRev-1321 models, the update rate is fixed at 10/12 cycles.

Reading the Chart

Each harmonic order is shown as a group of three bars, one per phase, identified by the **VA, VB,** and **VC** legend beneath the chart. The horizontal axis is the harmonic order, and the vertical axis is magnitude.

The chart displays harmonic orders up to the **63rd.** Use the scroll bar beneath the chart to move through the orders, since only a portion of the range is visible at any one time.

Click **Reset View** to return the chart to its default zoom and scroll position.

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5.5.6.4 Voltage Amplitude/Angle

The **Voltage Amplitude/Angle** page displays the harmonic content of each phase voltage in tabular form, listing the amplitude and phase angle of every harmonic order.

Navigate to **Reading → Power Quality → Voltage Amplitude/Angle** to view the data.

The Voltage Spectrum page presents the same harmonic content graphically, while this page gives the numeric values, including the phase angle of each component, not depicted in the chart. Angle information is what allows harmonic contributions from separate sources to be compared. Two loads producing the same harmonic order will add or partially cancel on the shared bus depending on the relative phase of their contributions.

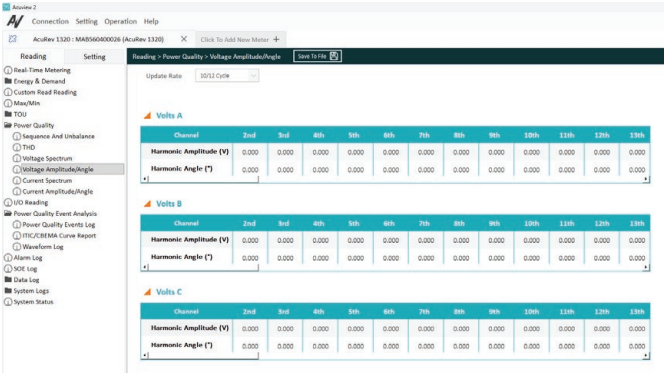


Figure 5-54 Voltage Harmonic Amplitude and Angle

Update Rate

The Update Rate dropdown selects the aggregation interval used for the displayed values such as 10/12 Cycle, 150/180 Cycle, 10min Aggregation, and 2hr Aggregation. In AcuRev-1321 models, the update rate is fixed at 10/12 cycles.

Saving the Data

Click **Save To File** to export the displayed values. The data is saved in CSV format and reflects the aggregation interval currently selected in the Update Rate dropdown.

> **INFO** The angle of a harmonic order is only meaningful when that order has appreciable amplitude. Where the amplitude reads zero or near zero, the corresponding angle carries no information and should be disregarded.

5.5.6.5 Current Spectrum

The **Current Spectrum** page displays the harmonic content of each phase current as a bar chart, showing the magnitude of each harmonic order.

Navigate to **Reading → Power Quality → Current Spectrum** to view the data.

Harmonic currents are drawn by the load, so this page identifies where distortion originates, while the voltage spectrum shows the result of those currents acting across the source impedance. Current harmonics are also the quantity of interest for thermal derating, since it contributes to conductor and transformer heating without contributing to useful power.

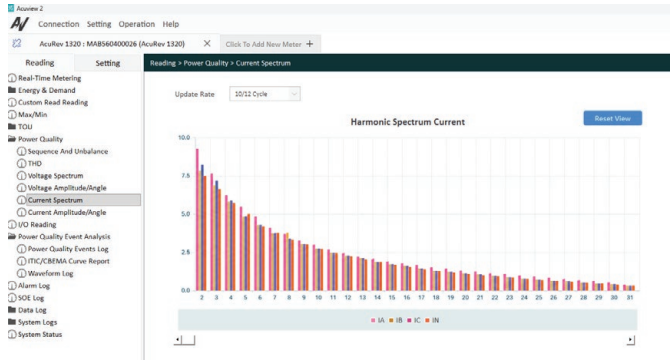


Figure 5-55 Current Harmonic Spectrum

Update Rate

The Update Rate dropdown selects the aggregation interval used for the displayed values: 10/12 Cycle, 150/180 Cycle, 10min Aggregation, and 2hr Aggregation. In AcuRev-1321 models, the update rate is fixed at 10/12 cycles.

Reading the Chart

The horizontal axis is the harmonic order, and the vertical axis is magnitude. The chart displays harmonic orders up to the 63rd. Use the scroll bar beneath the chart to move through the orders, since only a portion of the range is visible at any one time.

Click **Reset View** to return the chart to its default zoom and scroll position.

5.5.6.6 Current Amplitude/Angle

The **Current Amplitude/Angle** page displays the harmonic content of each phase current and the neutral current in tabular form, listing the amplitude and phase angle of every harmonic order.

Navigate to **Reading → Power Quality → Current Amplitude/Angle** to view the data.

The Current Spectrum page presents the same harmonic content graphically, while this page gives the numeric values, including the phase angle of each component, not depicted in the chart. Angle information is what distinguishes harmonic current originating downstream of the metering point from harmonic current flowing in from elsewhere on the system, and it determines whether contributions from separate loads add or partially cancel on the shared bus.

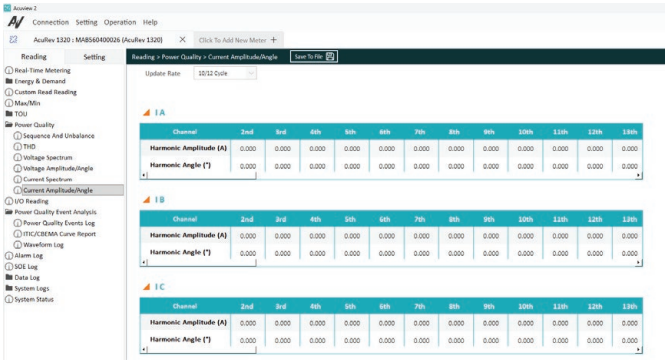


Figure 5-56 Current Harmonic Amplitude and Angle

Update Rate

The **Update Rate** dropdown selects the aggregation interval used for the displayed values, offering the same options as the other harmonic pages such as **10/12 Cycle, 150/180 Cycle, 10min Aggregation,** and **2hr Aggregation.** In AcuRev-1321 models, the update rate is fixed at 10/12 cycles.

Reading the Table

The page is divided into four tables, **I A, I B, I C,** and **I N,** one per phase plus the neutral. Each table contains two rows:

- **Harmonic Amplitude (A)**
- **Harmonic Angle (°)**

Columns are the harmonic orders and the table covers harmonic orders up to the 63rd. Use the scroll bar beneath each table to move through the orders, since only a portion of the range is visible at any one time.

The **I N** table reports the neutral current. Triplen or odd multiple harmonics, such as the 3rd, 9th, 15th and so on, sum rather than cancel in the neutral conductor, so the orders may show

amplitudes in the neutral that are significant relative to the neutral fundamental even when the phase currents are balanced.

Saving the Data

Click **Save To File** to export the displayed values. The data is saved in CSV format and reflects the aggregation interval currently selected in the **Update Rate** dropdown.

> **INFO** The angle of a harmonic order is only meaningful when that order has appreciable amplitude. If the amplitude reads zero or near zero, the corresponding angle carries no information and should be disregarded.

5.5.7 I/O Reading

The **I/O Reading** page displays the real-time state of the meter's digital inputs and digital output, along with the DI pulse counters.

Navigate to **Reading → I/O Reading** to view the data.

Data on this page depends on configuration of each channel under **Setting → I/O.** A digital input reports either a status or a count, not both, so the fields that do not apply to the selected mode are shown as a dash (-) and controls as disabled.

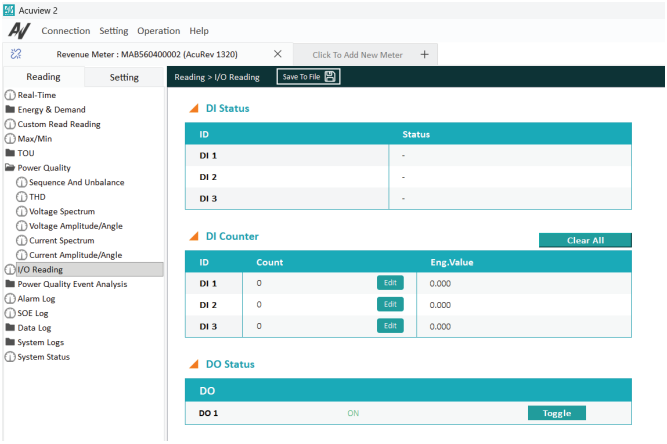


Figure 5-57 DI Status and Count

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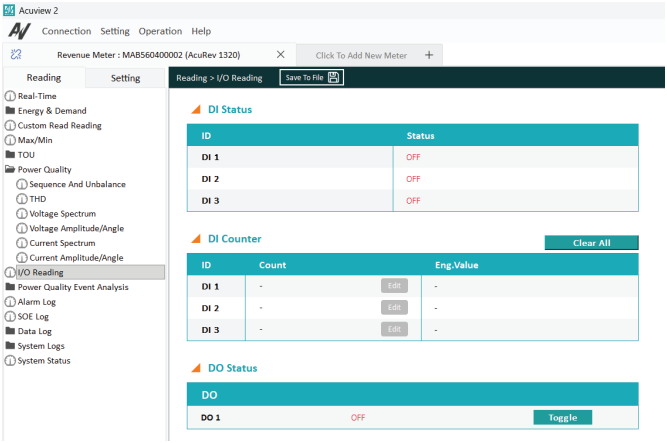


Figure 5-58 DO Status

DI Status

The **DI Status** table lists the three digital inputs, **DI 1** through **DI 3,** with the present state of each.

When a DI is configured for **Status Monitoring,** the **Status** column shows the real-time state as **OFF** or **ON.** When a DI is configured for **Pulse Counting,** the input is not being monitored as a status, and the column shows a dash.

DI Counter

The **DI Counter** table lists the accumulated pulse count and the converted engineering value for each digital input.

When a DI is configured for **Pulse Counting,** the **Count** column shows the accumulated pulse total and the **Eng.Value** column shows that count converted to the physical measurement it represents, using the scaling configured for the channel. When a DI is configured for Status **Monitoring,** both columns show a dash and the **Edit** button for that row is disabled.

Click **Edit** on a row to set that counter to a specific value, which is used when aligning the meter's count to an existing reading on the pulsing device.

Click **Clear All** to reset the counters for all three digital inputs to zero.

DO Status

The **DO Status** table shows the present state of the digital output, **DO 1,** as **OFF** or **ON.**

When the DO is configured as an **Alarm Indicator** or for **Energy Pulse Output,** the state is driven

by the meter and the table is read-only. When the DO is configured for **Manual Control,** click **Toggle** to change the output state directly.

Saving the Data

Click **Save To File** to export the displayed I/O values. The data is saved in CSV format.

> **INFO** Clearing the DI counters cannot be undone. Once cleared, the previous count is not recoverable, so record the existing values first if needed for billing or reconciliation.

5.5.8 Power Quality Event Analysis

5.5.8.1 Power Quality Events Log

The **Power Quality Events Log** page displays the power quality events recorded by the meter, with the timestamp, type, trigger channel, and the measured extremes for each event. Navigate to **Reading → Power Quality Event Analysis → Power Quality Events Log** to view the data.

The meter records six event types including **Voltage Sag, Voltage Swell, Voltage Interruption, Current Swell, Voltage Unbalance,** and **Current Unbalance,** using the thresholds and hysteresis configured under S**etting → PQ Event & Waveform.** Only event types enabled on that page are detected and logged. Up to 200 event records are stored in flash memory. When the log is full, the oldest record is overwritten by the newest, on a first-in, first-out basis.

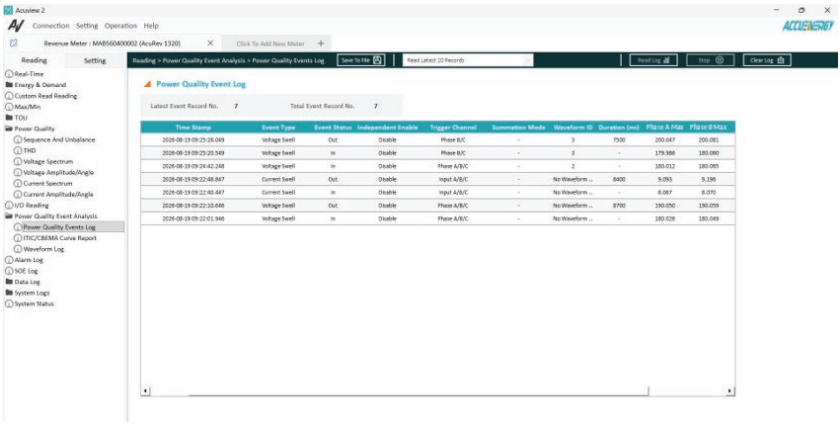


Figure 5-59 Power Quality Event Log

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Reading the Log

Records are not retrieved automatically. When the page is first opened the table is empty, showing only the column headers so the events must be read from the meter before it appears.

Use the records dropdown to select how many of the most recent records to retrieve such as **Read Latest 20 Records, Read Latest 60 Records,** or **Read Latest 200 Records.** Click **Read Log** to begin retrieval. Records populate the table as read, so a large selection will fill in progressively. Click **Stop** to end a retrieval in progress. The records already retrieved remain displayed.

Two summary fields above the table are populated from the meter regardless of whether the log has been read.

- **Latest Event Record No.:** Record number of the most recent event stored in the meter.
- **Total Event Record No.:** Number of event records currently held in the log.

Log Columns

The table is wider than the window; scroll horizontally to reach the measured value columns.

Table 5-67 Log Column Description

Column	Description
No.	Record Number Assigned Sequentially by the Meter
Time Stamp	Date and Time of the Record to the Millisecond
Event Type	Condition detected such as **Voltage Sag, Voltage Swell, Voltage Interruption, Current Swell, Voltage Unbalance,** or **Current Unbalance**
Event Status	**In** marks the Start of the Event at the Actuation Threshold **Out** marks the Event End at the Hysteresis Release Threshold
Independent Enable	Indicates whether the Independent Input Channel Function was Active when the Event was Recorded
Trigger Channel	Phase or Input Channel on which the Condition was Detected
Summation Mode	Summation Group associated with the Even where Applicable Shown as a Dash when Not Applicable
Waveform ID	Waveform Record Identifier of Captured Event to Locate the Corresponding Entry on the **Waveform Log** Page Shown as **No Waveform** when Waveform Triggering was Not Enabled for that Event Type
Duration (ms)	Elapsed time of the event in milliseconds Populated on the **Out** record only **In** record shows a dash as Duration is not known until the Event Ends

Column	Description
Phase A Max / Phase B Max / Phase C Max	Maximum Values Measured During the Event per Phase
Phase A Min / Phase B Min / Phase C Min	Minimum Values Measured During the Event per Phase

Events are recorded as a pair of entries. The **In** record captures the onset and the **Out** record captures the recovery and the total duration, so a single disturbance occupies two rows in the table.

The unit of the **Phase** columns depends on the event type such as volts for **Voltage Sag, Voltage Swell,** and **Voltage Interruption.** amperes for **Current Swell** and percent for **Voltage Unbalance** and **Current Unbalance.**

Clearing and Saving the Log

Click **Save To File** to export the retrieved records. The data is saved in CSV format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase all power quality event records from the meter.

> **INFO** Clearing the log cannot be undone. Save the records to file first if needed for reporting or analysis.

5.5.8.2 ITIC/CBEMA Curve Report

The **ITIC/CBEMA Curve Report** page plots the recorded voltage sag and swell events against the ITIC/CBEMA curve, showing whether each disturbance falls inside or outside the voltage tolerance envelope that typical equipment is expected to withstand.

Navigate to **Reading → Power Quality Event Analysis → ITIC/CBEMA Curve Report** to view the data.

Where the **Power Quality Events Log** lists each disturbance individually, this page places them in context. A deep sag lasting a few milliseconds and a shallow sag lasting several seconds may both be logged as events, but only one may be severe enough to disturb connected equipment. The curve makes that distinction visible as deeper the deviation and longer it persists, further the event moves out of the acceptable region.

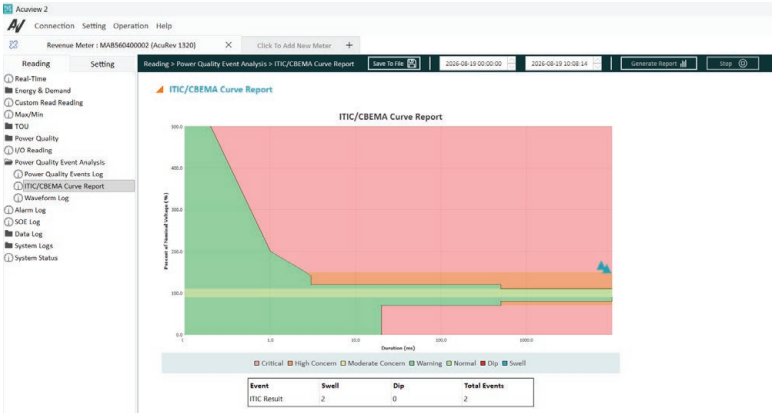


Figure 5-60 ITIC/CBEMA Curve Report

Generating the Report

The report is not produced automatically. When the page is first opened the chart shows only the curve regions, with no events plotted and the results table reading zero.

Set the reporting window using the two date and time fields, which define the start and end of the period to be analyzed. Then click **Generate Report** to retrieve the events in that window and plots the curve. Click **Stop** to end generation in progress.

The chart rescales to the events found, so the visible duration range will differ between reports depending on the events plotted.

Reading the Chart

The horizontal axis is event duration in milliseconds, on a logarithmic scale. The vertical axis is the magnitude of the disturbance as a percentage of nominal voltage, where 100% is the nominal voltage configured under **Setting → PQ Event & Waveform.**

Events are plotted as triangular markers, identified by the legend beneath the chart:

- **Swell:** Upward-pointing marker, plotted above 100%.
- **Dip:** Downward-pointing marker, plotted below 100%.

The background regions indicate severity, from **Normal** through **Warning, Moderate Concern, High Concern,** and **Critical.** An event falling in the **Normal** region is within the tolerance envelope and an event further from it represents a disturbance progressively more likely to affect connected equipment.

The **ITIC Result** table beneath the chart summarizes the reporting window, giving the number of **Swell** events, the number of Dip events, and the **Total Events** plotted.

Saving the Report

Click **Save To File** to export the report. The chart and table are saved in PNG or JPG format.

> **INFO** Only voltage sag and swell events appear on this chart. Current swell and unbalance events are recorded in the **Power Quality Events Log** but have no place on a voltage tolerance curve and are excluded from the report.

5.5.8.3 Waveform Log

The **Waveform Log** page lists the waveform records captured by the meter and displays the sampled voltage and current waveforms for a selected record.

Navigate to **Reading → Power Quality Event Analysis → Waveform Log** to view the data.

Where the **Power Quality Events Log** reports what happened and when, the waveform record shows the actual sampled shape of the voltage and current through the disturbance. This is what distinguishes a genuine supply-side event from a measurement artifact, and it reveals detail that summary values cannot carry, such as the point on the wave at which the disturbance began or the presence of transients and notching.

Waveform capture is configured under **Setting → PQ Event & Waveform,** where the sample rate and the number of cycles recorded before and after the trigger are set. Recording can be triggered manually, by a digital input, or by a power quality event. Up to 200 waveform records are stored. When the log is full, the oldest record is overwritten by the newest, on a first-in, first-out basis.

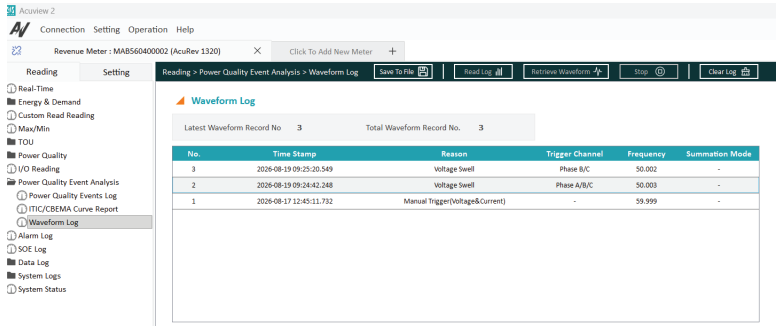


Figure 5-61 Waveform Log

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Reading the Log

Records are not retrieved automatically. When the page is first opened the table is empty, showing only the column headers, and the **Waveform Chart** below is blank.

Click **Read Log** to retrieve the waveform records from the meter. Click Stop to end a retrieval in progress. The records that are already retrieved remain displayed.

Two summary fields above the table are populated from the meter regardless of whether the log has been read:

- **Latest Waveform Record No:** Record number of the most recent waveform stored in the meter.
- **Total Waveform Record No.:** Number of waveform records currently held in the log.

Log Columns

Table 5-68 Log Columns Description

Column	Description
No.	Record Number Assigned Sequentially by the Meter
Time Stamp	Date and Time of the Trigger to the Millisecond
Reason	What Initiated the Capture Power Quality Triggers Name the Event Type, Such As **Voltage Swell** Manually Initiated Captures Are Shown as **Manual Trigger,** with the Recorded Quantity in Parentheses
Trigger Channel	Phase or Input Channel on which the Triggering Condition Was Detected Shown As a Dash for Manual Triggers and Not Tied to a Channel
Frequency	System Frequency Measured at the Time of Capture in Hertz
Summation Mode	Summation Group Associated with the Record where Applicable Shown As a Dash When Not Applicable

Displaying a Waveform

The waveform samples are stored separately from the log entry and are not transferred when the log is read. To display a waveform, select the record in the table, then click **Retrieve Waveform.** The samples are read from the meter and plotted in the **Waveform Chart** section below, with the timestamp of the selected record shown in the chart title.

Click **Stop** to end a retrieval in progress.

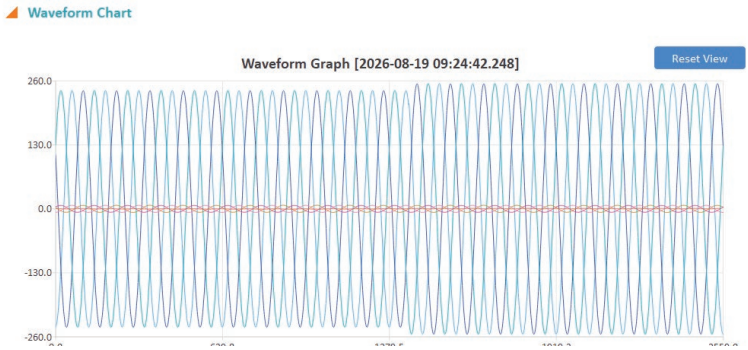


Figure 5-62 Waveform Chart of Retrieved Record

Reading the Chart

The horizontal axis is the sample index across the captured window, spanning the pre-trigger and post-trigger cycles configured for the meter. The vertical axis is magnitude, in volts and amperes.

Traces are identified by the **Volts A, Volts B, Volts C, I A, I B, I C,** and **I N** legend beneath the chart.

Click and drag on the chart to zoom into a region of interest, which is normally necessary to examine individual cycles, since the full capture window contains many cycles at the default view. Click **Reset View** to return the chart to its default zoom and scroll position.

Clearing and Saving the Log

Click **Save To File** to export the retrieved data. The data is saved in CSV format.

Click **Clear Log** to erase all waveform records from the meter.

> **INFO** Clearing the log cannot be undone. Save any records needed for reporting or analysis before clearing.

5.5.9 Alarm Log

The **Alarm Log** page displays the alarm records stored by the meter, showing when each alarm changed state and the values that were present at the time.

Navigate to **Reading → Alarm** Log to view the data.

Alarms are configured under **Setting → Alarm,** where each alarm ID is assigned up to two parameters, a comparison logic, pickup and dropout values, and pickup and dropout delays. Up to

200 alarm records are stored. When the log is full, the oldest record is overwritten by the newest, on a first-in, first-out basis.

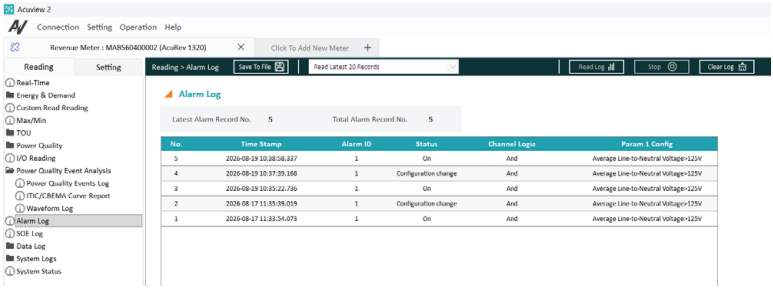


Figure 5-63 Alarm Log

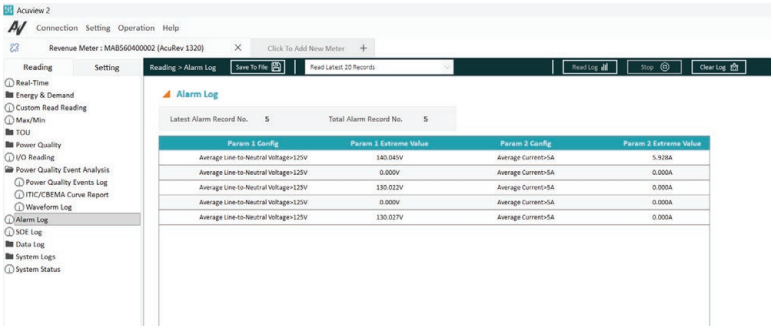


Figure 5-64 Alarm Log Measured Values

Reading the Log

Records are not retrieved automatically. When the page is first opened the table is empty, showing only the column headers.

Use the records dropdown to select how many of the most recent records to retrieve such as **Read Latest 20 Records, Read Latest 60 Records,** or **Read Latest 200 Records.** Then click Read Log to begin retrieval. Click Stop to end a retrieval in progress. The records already retrieved remain displayed.

Two summary fields above the table are populated from the meter regardless of whether the log has been read:

- **Latest Alarm Record No.:** Record number of the most recent alarm stored in the meter.
- **Total Alarm Record No.:** Number of alarm records currently held in the log.

Log Columns

The table is wider than the window; scroll horizontally to reach the measured value columns.

Table 5-69 Alarm Log Description

Column	Description
No.	Record Number Assigned Sequentially by the Meter
Time Stamp	Date and Time of the Record to the Millisecond
Alarm ID	Alarm Entry that Produced the Record Corresponding to the ID Configured under **Setting → Alarm**
Status	State Change captured by the Record **On** indicates Alarm condition was Met and Alarm Activated. **Off** indicates Condition Cleared and the Alarm Released. **Configuration change** indicates the Alarm settings were Modified Recorded so that Later Entries can be Interpreted against the Correct Configuration
Channel Logic	How Two Configured Parameters are Combined **And** requires Both Conditions to be Satisfied **Or** requires Either Conditions to be Satisfied
Param 1 Config	First Configured Condition shown as Parameter, Comparison Operator, and Pickup Value
Param 1 Extreme Value	Most Extreme Value Reached by the First Parameter during the Alarm
Param 2 Config	Second Configured Condition in the Same Form
Param 2 Extreme Value	Most Extreme Value reached by the Second Parameter during Alarm
Duration (ms)	Elapsed time the Alarm remained Active in milliseconds Populated when Alarm Releases and shown as Dash while Alarm is still Active or on Records that Do Not Represent Completed Alarm Cycle

The **Config** columns describe the alarm as it was set up, not what was measured, so it reads the same on every record for a given alarm ID until the configuration is changed.

Records with a **Status** of **Configuration** change show zero in the extreme value columns. No alarm condition occurred, so no measured extremes are associated with the entry.

Clearing and Saving the Log

Click **Save To File** to export the retrieved records. The data is saved in CSV format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase all alarm records from the meter.

> **INFO** An alarm is recorded only when both the condition and its configured delay are satisfied. A parameter that crosses the pickup value but returns before the pickup delay elapses does not generate a record, so brief excursions may be visible in the real-time readings without appearing in this log.

5.5.10 SOE Log

The **SOE Log** page displays the Sequence of Events records stored by the meter, showing each change of state on the digital inputs together with the time it occurred. Navigate to **Reading → SOE Log** to view the data.

A digital input configured for **Status Monitoring** under **Setting → I/O** generates an SOE record every time its state changes. Because each record is timestamped to the millisecond, the log establishes the order in which separate inputs changed, which is what distinguishes a cause from its consequence when several devices respond to the same disturbance. Up to 200 SOE records are stored. When the log is full, the oldest record is overwritten by the newest, on a first-in, first-out basis.

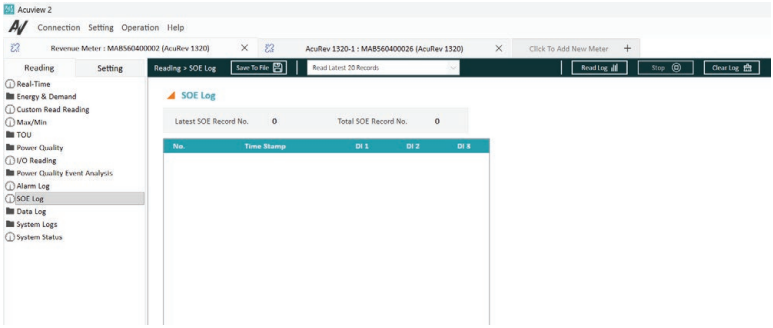


Figure 5-65 SOE Log

Reading the Log

Records are not retrieved automatically. When the page is first opened the table is empty, showing only the column headers.

Use the records dropdown to select how many of the most recent records to retrieve such as **Read Latest 20 Records, Read Latest 60 Records,** or **Read Latest 200 Records.** Then click **Read Log** to begin retrieval. Click **Stop** to end a retrieval in progress. The records already

retrieved remain displayed.

Two summary fields above the table are populated from the meter regardless of whether the log has been read:

- **Latest SOE Record No.:** Record number of the most recent event stored in the meter.
- **Total SOE Record No.:** Number of SOE records currently held in the log. A value of zero means no state changes have been recorded.

Log Columns

Table 5-70 SOE Log Description

Column	Description
No.	Record Number Assigned Sequentially by the Meter
Time Stamp	Date and Time of the State Change to the Millisecond
DI 1 / DI 2 / DI 3	State of each Digital Input at the Moment the Record was created and shown as OFF or ON.

Each record captures the state of all three inputs, not only the one that changed. Comparing a record with the one before it shows which input transitioned, while the remaining columns give the conditions present at that instant.

Clearing and Saving the Log

Click **Save To File** to export the retrieved records. The data is saved in CSV format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase all SOE records from the meter.

INFO

Only inputs configured for **Status Monitoring** produce SOE records. An input configured for **Pulse Counting** increments its counter without logging, so no entries will appear for that input even though it is receiving a signal.

5.5.11 Data Log

The **Data Log** branch contains the reading pages for the meter's four independent loggers which are **Data Log 1 Reading, Data Log 2 Reading, Data Log 3 Reading,** and **Trend Log Reading.** Navigate to **Reading → Data Log** and select the logger to view.

Data Logs 1 through 3 record instantaneous values of the selected parameters at each logging interval. The Trend Log records the maximum, minimum, and average of its selected parameters

over each interval.

Each logger is configured independently under **Setting → Data Log,** where the parameters to record, the number of sectors allocated, the logging interval, and the start mode are set. The columns shown on a **Reading** page are exactly the parameters selected for that logger. A logger with no parameters assigned has nothing to record and its page will remain empty.

5.5.11.1 Data Log 1, 2, and 3 Reading

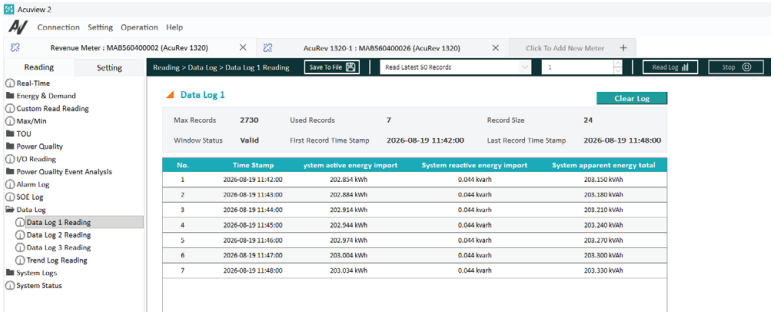


Figure 5-66 Data Log 1 Reading

The three data log reading pages are identical in operation and differ only in which logger it is read.

Log Summary

The fields above the table describe the state of the logger and are populated from the meter without reading the records.

Table 5-71 Data Log 1 Description

Field	Description
Max Records	Total Number of Records the Logger can hold Determined by the Sectors Allocated and Size of Each Record
Used Records	Number of Records Currently Stored
Record Size	Size of a Single Record in bytes and Determined by the Number and Type of Parameters Selected
Window Status	Whether the Stored Data forms a Valid, Continuous set Valid indicates the Log is Intact and Readable
First Record Time Stamp	Timestamp of the Oldest Record Held

Field	Description
Last Record Time Stamp	Timestamp of the Most Recent Record Held

Comparing **Used Records** with **Max Records** shows how much capacity remains before the logger begins overwriting its oldest records.

Reading the Log

Records are not retrieved automatically. Because a data log can hold a very large number of records, reading it in full may take considerable time, so several retrieval methods are provided.

Use the records dropdown to select the retrieval method:

- **Read Latest 50 Records**
- **Read 1000 Records (From Selected Record)**
- **Read 64000 Records (From Selected Record)**
- **Read 1000 Records (From Selected Time)**
- **Read 64000 Records (From Selected Time)**

For the methods that read from a selected point, enter the starting record number in the field beside the dropdown. Then click **Read Log** to begin retrieval. Records populate the table as they are read. Click **Stop** to end a retrieval in progress. The records already retrieved remain displayed.

Log Columns

The **No.** and **Time Stamp** columns are always present. Every remaining column is a parameter selected for that logger under **Setting → Data Log,** shown in the order it was added, with its engineering unit. The table is normally wider than the window. Scroll horizontally to reach the later parameters.

Since the columns follow the configuration, the same reading page will show different columns on differently configured meters, and changing the parameter selection changes what subsequent records contain.

5.5.11.2 Trend Log Reading

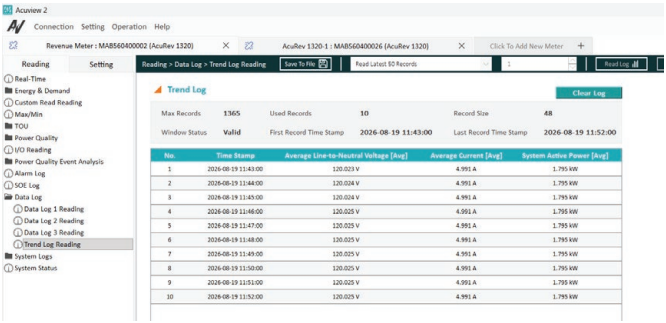


Figure 5-67 Trend Log Reading

The **Trend Log Reading** page operates in the same way, with the same summary fields, retrieval methods, and controls.

The difference is in the columns. Each selected parameter is recorded as a statistic over the logging interval rather than as a single instantaneous sample, and the column header carries the corresponding label, such as **[Avg], [Max],** or **[Min].** A parameter selected for the trend log therefore occupies more space per record than the same parameter in a data log, which is reflected in the larger **Record Size** and the correspondingly lower **Max Records** for the same sector allocation.

Clearing and Saving the Log

Click **Save To File** to export the retrieved records. The data can be saved in text, CSV, or Excel format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase all records from the selected logger. Each logger is cleared independently; clearing one does not affect the others.

> **INFO** Clearing a log cannot be undone. Save any records needed for reporting or billing before clearing.

> **INFO** Changing a logger's parameter selection alters the record structure. Retrieve and save any existing records before making the change, as records written under the previous configuration may not align with the new column layout.

5.5.12 System Logs

The System Logs branch contains two independent logs, includes the Audit Log, which records changes affecting metering integrity, and the System Log, which records operational and diagnostic events. Each holds up to 5000 entries.

Navigate to **Reading → System** Logs and select the log to view.

5.5.12.1 Audit Log

The **Audit Log** records are applicable for MID certified models only. The metering-related events including parameter changes, seal status changes, firmware updates, hardware faults, and events affecting measurement integrity, capturing what changed, when, and the values before and after.

Navigate to **Reading → System Logs → Audit Log** to view the data.

The log exists to provide a traceable record for revenue metering. Where the System Log covers general device operation, the audit log is confined to the settings and conditions that can affect a billing quantity, so an entry here always represents something with metrological significance.

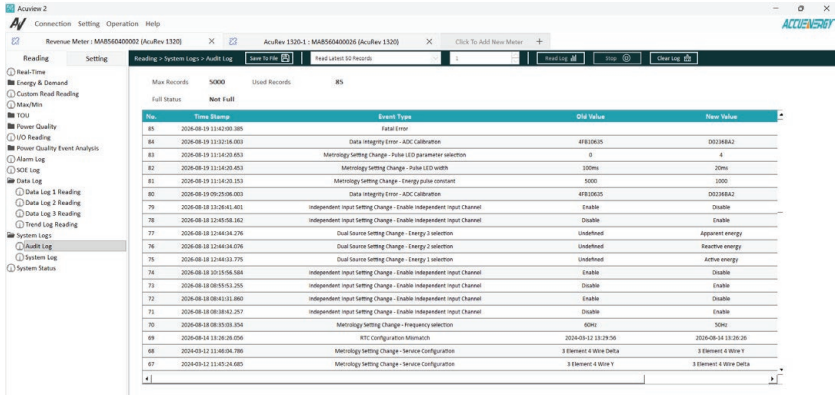


Figure 5-68 Audit Log

Log Summary

The fields above the table are populated from the meter without reading the records.

Table 5-72 Audit Log Description

Field	Description
Max Records	Fixed Capacity of 5000 Entries Log
Used Records	Number of Entries Currently Stored
Full Status	Whether the Log has Reached Capacity Not Full Indicates Space Remains

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Reading the Log

Records are not retrieved automatically. Use the records dropdown to select the retrieval method, then click **Read Log** to begin. For methods that read from a selected point, enter the starting record number in the field beside the dropdown. Click **Stop** to end a retrieval in progress. The records already retrieved remain displayed.

Log Columns

Table 5-73 Audit Log Columns Description

Column	Description
No.	Record Number Assigned Sequentially by the Meter
Time Stamp	Date and Time of Entry To The Millisecond
Event Type	Category of Change or Condition Followed by Specific Item Affected
Old Value	Value in Effect Before the Change
New Value	Value in Effect After the Change

Logged Events

The following events are written to the Audit Log.

Table 5-74 Event Recorded in Audit Log

Event	Recorded content	When detected
Firmware CRC Check Failure	Check Item, Actual Value, Expected Value	At Startup
Production Information CRC Check Failure	Check Item, Actual Value, Expected Value	At Startup
Calibration Value CRC Check Failure	Check Item, Actual Value, Expected Value	At Startup
Metering Configuration CRC Check Failure	Check Item, Actual Value, Expected Value	At Startup
Energy Value CRC Check Failure	Check Item, Actual Value, Expected Value	At Startup
RTC Fault	-	During Operation
ADC Fault	-	During Operation
SDRAM Fault	-	During Operation
Flash Fault	-	During Operation
FRAM Fault	—	During Operation
Audit Log Storage Full	—	During Operation
Seal Status Change	Old State, New State	During Operation

Event	Recorded content	When detected
Firmware Update	Old Version, New Version	At Startup
Time Synchronization Deviation	Time Before Synchronization, Time After Synchronization	During Operation
Audit Log Integrity Error	Data Integrity Error – Audit Log	On Log Read

INFO A time synchronization is logged only when the correction moves the clock by more than 300 seconds. Smaller corrections, including routine NTP adjustments, are not recorded.

The first eleven events each raise a Fatal Error as well as an Audit Log entry. See Section 3.6. Events with no associated value pair leave the **Old Value** and **New Value** columns blank.

An **Audit Log integrity error** is not an event detected in the meter's operation. It is recorded when the CRC-32 checksum stored with an entry fails verification as that entry is read and indicates the record itself has been corrupted or altered.

Saving the Log

Click **Save To File** to export the retrieved records. The data is saved in CSV format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase the audit records from the meter.

INFO The audit log cannot be cleared while the meter is sealed. This is intentional, since the record's value for revenue metering depends on it being unalterable once the meter is in service.

INFO When the log reaches capacity the final entry recorded is a full-log notice. Further events are not stored, so the log should be read and saved before it fills if a continuous record is required. When the **Audit Log** is full, a **Fatal Error** is triggered.

5.5.12.2 System Log

The **System Log** records the meter's operational and diagnostic events, such as power-on startups and clearing operations performed by the user.

Navigate to **Reading → System Logs → System Log** to view the data.

Where the Audit Log is confined to changes affecting metering integrity, this log covers general

device operation and is the first place to look when diagnosing a fault or accounting for a gap in recorded data. A run of unexpected startup entries, for example, points to an unstable auxiliary supply rather than a metering problem. A clearing operation explains why an accumulated value reset without any measurement anomaly. The log holds up to 5000 entries.

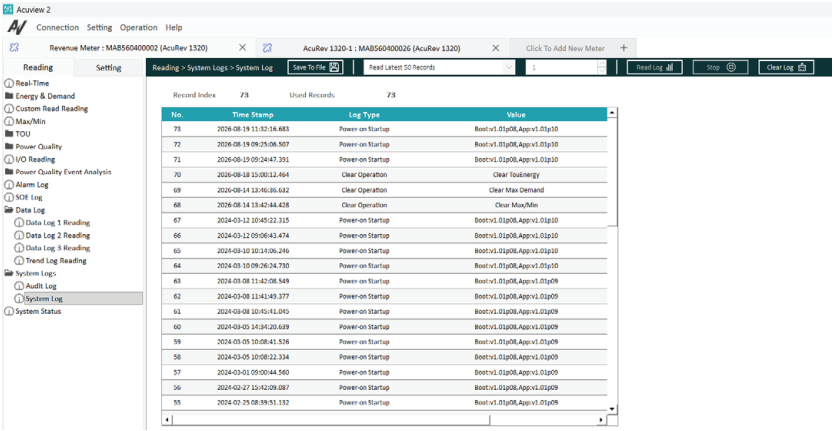


Figure 5-69 System Log

Log Summary

The fields above the table are populated from the meter without reading the records.

Table 5-75 System Log Description

Field	Description
Record Index	Index of the Most Recent Entry Stored in Meter
Used Records	Number of Entries Currently Stored

Reading the Log

Records are not retrieved automatically. Use the records dropdown to select the retrieval method, then click **Read Log** to begin. For methods that read from a selected point, enter the starting record number in the field beside the dropdown. Click **Stop** to end a retrieval in progress. The records already retrieved remain displayed.

Log Columns

Table 5-76 System Log Columns Description

Column	Description
No.	Record Number Assigned Sequentially by Meter
Time Stamp	Date and Time of the Entry to the Millisecond
Log Type	Category of Event such as **Power-on Startup** or **Clear Operation**
Value	Detail Associated with the Entry. For a Startup this is Firmware in Use, given as the Boot and Application Versions For a Clearing operation it names what was cleared, such as **Clear Max Demand, Clear Max/Min,** or **Clear Tou Energy**

Because startup entries carry the firmware versions, the log also serves as a record of when the meter was updated such as the version string changes at the first startup following an upgrade.

Saving the Log

Click **Save To File** to export the retrieved records. The data is saved in CSV format. Only records that have been read into the table are exported, so read the log before saving.

Click **Clear Log** to erase the system records from the meter.

INFO

Clearing this log removes the record of past startups and clearing operations, which is often the evidence needed to explain an anomaly in the metered data. **Save** the log to file before clearing it.

5.5.13 System Status

The System Status page displays the meter's clock, runtime counters, and seal state, and provides the controls for setting the time and performing device-level resets.

Navigate to **Reading → System Status** to view the data.

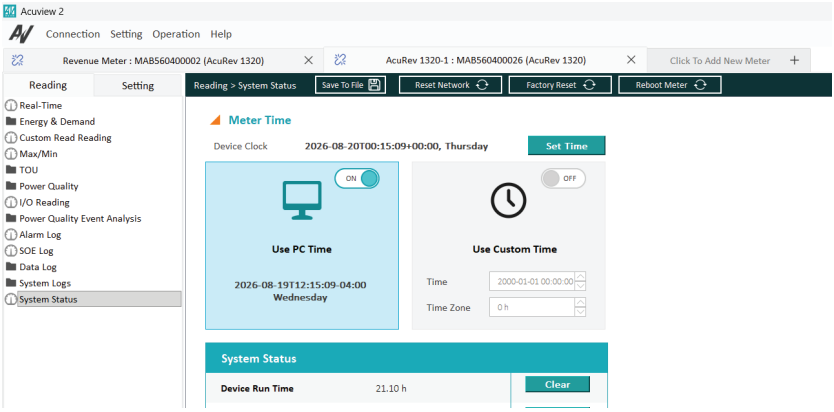


Figure 5-70 System Status

Meter Time

The Device Clock field shows the time currently held by the meter, in the format YYYY-MM-DD HH:MM:SS together with the UTC offset and the day of the week.

The clock can be set by one of two methods, selected using the toggle above each panel. Only one method can be active at a time.

- **Use PC Time:** Meter takes the current time from the computer running Acuview 2. The time that will be applied is shown in the panel and updates continuously.
- **Use Custom Time:** Meter takes the time entered manually. Enter the value in the **Time** field, in the format YYYY-MM-DD HH:MM:SS, and set the **Time Zone** field to the offset that applies at the installation.

After selecting the method, click **Set Time** to write the value to the meter.

System Status

Table 5-77 System Status Description

Field	Description
Device Run Time	Accumulated Time in Hours that Meter has been Powered ON
Device Load Time	Accumulated Time in Hours Meter has Measured Load
Time Synchronization Status	Whether the Clock is being Synchronized from an External Time Source, Such As SNTP **Unsynchronized** Indicates Meter Is Running on Internal Clock Alone
Seal Status	**Sealed** or **Unsealed** Status of the Meter

Click **Clear** beside **Device Run Time** or **Device Load Time** to reset that counter to zero. The two counters are cleared independently.

Device Controls

The following controls are available from the toolbar at the top of the page.

- **Reset Network:** Restores the meter's network configuration to its default settings.
- **Factory Reset:** Restores all configuration to factory defaults and erases all stored data, including data logs, alarm records, and SOE records.
- **Reboot Meter:** Restarts the meter. Configuration and stored data are retained.

Saving the Data

Click **Save To File** to export the values shown on this page. The data is saved in CSV format.

INFO

Factory Reset is disabled while the meter is sealed. **Factory Reset** cannot be undone. All logged data is erased along with the configuration, so export any records that may be needed before proceeding.

Chapter 6: Communication

The AcuRev 1320 supports serial Modbus RTU and BACnet MS/TP, as well as Ethernet Modbus TCP and BACnet/IP.

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/IP packets. Key differences 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; CRC is not needed because TCP already ensures data integrity.

Port:

- Modbus TCP typically uses TCP port 502.

Transport:

- Modbus RTU is for serial lines including RS-485 or RS-232.
- 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 RS-485 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:** RS-485 serial line.
- **Access method:** Token-passing for bus arbitration.
- **Application:** Building automation including HVAC, lighting, sensors.

AcuRev 1320 supports the mainstream open communication protocol Modbus. The standard configuration is Modbus-RTU protocol. This chapter describes the protocol itself and the conventions the meter follows. The parameter address table is not reproduced here. It is published separately as a spreadsheet, together with the BACnet MS/TP address table and EPICS.

6.1 Modbus Introduction

6.1.1 Transmission Mode

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

Table 6-1 Protocol Description

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

6.1.2 Protocol

When a data frame arrives at the terminal device, it enters the addressed device through a simple **port,** the device removes the **envelope** or data 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 it generates to the obtained **envelope** and returns the data frame to the sender. The returned response data contains the following 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 6-2 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 or 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 6-3 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 respond to the request. This data may be a numerical value, address or setting. For example, Function Code tells the terminal to read one register, Data Field needs to specify reading from which register and how many registers to read.
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. Error Check ensures 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).

6.1.3 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 appended to the data frame. The receiving device recalculates the CRC on the data it receives and compares the result with the value in the received CRC field. If the two values do not match, the frame is discarded and no response is returned.

The CRC is calculated over the message bytes only. Each byte contributes its eight data bits; the start bit, stop bit, and any parity bit take no part in the calculation.

The calculation begins by presetting a 16-bit register to all 1s. Each byte of the message is then combined with the current contents of this register in turn. For each byte, the register is XORed with the byte and then shifted right eight times. At each shift a zero is fed into the most significant bit and the least significant bit is shifted out and examined: if the bit shifted out is 1, the register is XORed with the fixed value 0xA001; if it is 0, no further action is taken for that shift. When every byte of the message has been processed in this way, the contents of the register are the CRC value.

The process of generating a CRC is:

1. Preset a 16-bit register to 0xFFFF (all 1s). This is the CRC register.
2. XOR the first byte of the message with the low byte of the CRC register and store the result back in the CRC register.
3. Shift the CRC register one bit to the right, filling the most significant bit with 0, and examine the bit shifted out of the least significant position.
4. If the bit shifted out is 0, no action is required. If the bit shifted out is 1, XOR the CRC register with 0xA001.
5. Repeat steps 3 and 4 until eight shifts have been performed. The byte is now fully processed.
6. Repeat steps 2 to 5 for each remaining byte of the message, until all bytes have been processed.
7. The contents of the CRC register are the CRC value. Append it to the message with the low byte first, followed by the high byte.

For the example in protocol example table, the message bytes 01 03 20 00 00 02 produce a CRC register value of 0xCBCF, which is appended to the frame as CF CB.

6.2 Modbus Communication Format

The examples in this section will use the format as much as possible. The numbers are in hexadecimal.

Table 6-4 Protocol Example

Address	Function Data	Data Start Reg Hi	Data Start Reg Lo	Data #of Regs Hi	Data #of Regs Lo	CRC16 Lo	CRC16 Hi
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 Regs Hi : Number of registers, high byte

Data #of Regs Lo : Number of registers, low byte

CRC16 Lo: CRC low byte

CRC16 Hi: CRC high byte

6.3 AcuRev 1320 Application Details

The following conventions apply to all parameters exchanged with the AcuRev 1320.

6.3.1 Type of Data

Bit refers to binary bits.

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

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

Double is a double-precision floating-point number, occupying four data addresses. A total of 8 bytes.

Dword is a 32-bit unsigned integer, occupying two data addresses. The high word comes first, and the low word comes after. A total of 4 bytes. Value range 0~4294967295; Rx = high word × 65536 + low word.

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

Each parameter's data type is given in the **Data type** column of the address table, and the **Reg** column gives the number of 16-bit registers it occupies. A parameter spanning more than one register must be read in a single request covering the full span and reading a partial span returns an incomplete value.

6.3.2 Data Scaling

The communication value of the instrument is not necessarily equal to the actual value. There is a certain conversion relationship between the values. This is very important. The developer of the upper-level software must establish which conversion relationship applies to each parameter collected, otherwise it will lead to wrong results.

Where a parameter is scaled, the scaling factor is stated in the **Range** column of its entry in the address table.

6.3.3 Energy Register Data Types

Most energy registers are double-precision values with a resolution of 0.001 kWh. The following register groups are retained as 32-bit unsigned integers with a resolution of 0.1 kWh, for compatibility with existing installations:

- 0x4620–0x463x
- 0x4049–0x4058
- TOU energy registers
- Dual Source Energy registers (uint32 / int32)

Check the data type column in the parameter address table before scaling a value.

6.3.4 System Status Registers for MID Certified Models

MID-certified models provide read-only registers reporting integrity check results and Fatal Error status in real time. These are read by direct Modbus query and Acuview2 does not display it.

Integrity check results: Individual bits report failure of boot firmware, application firmware, production information, ADC calibration, metering configuration, dual source energy configuration, energy data, and audit log data.

Fatal Error status: Individual bits report of data integrity fault, audit log storage exhausted, RTC fault, ADC fault, Flash fault, FRAM fault, SDRAM fault.

Register addresses and bit assignments are given in the parameter address table.

6.4 Parameter Address Table

The complete Modbus parameter address table is published as a separate spreadsheet rather than within this manual. It is available from the AcuRev 1320 product page on the Accuenergy website.

Publishing it separately keeps the register map current between manual revisions and allows the addresses to be filtered, searched, and imported directly into master-station or gateway configuration tools.

Workbook Structure

The workbook is divided into sheets by data category. Each sheet lists, for every parameter:

- The register address, in both hexadecimal and decimal.
- The parameter description.
- The data type and the number of registers occupied.
- Read/write access.
- The valid range and, where applicable, the scaling factor.
- The default value, for configurable parameters.

The bit-addressed DI, DO, and RO status registers, accessed with function codes 01, 02, and 05,

are listed in their own sheet and are addressed separately from the 16-bit holding registers.

Other Protocol Documents

The BACnet MS/TP address table and the EPICS file are also published separately and are available on request or from the product page.

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