# AcuPanel 9104X

## Energy Submetering Panel Installation Guide




c UL us

UL 508A

ACCUENERGY

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Please read this installation guide carefully before installation, operation, and maintenance of the AcuPanel 9104X.

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 prior notice as part of continuing improvements. Please ask the local representative for the latest product specifications before ordering.

The following symbols appear throughout this documentation and on the AcuPanel 9104X, in addition to the electrical warning of danger or safety risk during the installation, commissioning and operation.



**Electrical Shock Hazard:** Contains information about procedures which must be followed to prevent the risk of electric shock and danger that can result in personal injury or death.



**Safety Warning:** Contains information about circumstances which if not considered may result in personal injury or death.



**Info:** An advance notice to provide additional information before an action is taken by the user.

Installation and maintenance of the AcuPanel 9104X shall only be performed by qualified, competent professionals who have received training and have experience with high voltage and current devices.

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

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# Introduction

## Overview

The AcuPanel 9104X is pre-wired energy submetering panel housed in a NEMA 4X-rated polycarbonate enclosure. UL 508A certified suitable for indoor and outdoor applications, it supports the Acuvim II and Acuvim L series, as well as the AcuRev 1310 series multifunction meters.

Its self-powered design draws operating power directly from the voltage measurement inputs, eliminating the need for a separate control power supply.



Acuvim II Acuvim L AcuRev1310

**Figure 1 AcuPanel 9104X Compatible Meters**

### Typical Applications

- Submetering and energy management systems
- Power generation and energy storage
- Microgrid systems
- Building automation and SCADA systems
- Data centres and Power Distribution Units (PDUs)
- Substation and distribution monitoring
- Transformer monitoring and measurement & verification
- OEM panel integration

# Package Contents

**Info**

Carefully open the packaging of the panel and do not use excessive force.

Inspect all the contents of the package are not damaged before installing the panel.

| | |
|---|---|
| A | AcuPanel 9104X Energy Submetering Panel |
| B | Pre-installed Acuvim II, Acuvim L, or AcuRev 1310 Multifunctional Meters |
| C | Four Wall Mount Lugs and Screws |
| D | Current Transformer Terminal Blocks (Not Pictured) |
| E | Shorting Blocks for 5A Current Transformers (Not Pictured) |
| F | Voltage Input Terminal Blocks (Not Pictured) |
| G | Quick Setup Guide (Not Pictured) |

A



B



C



# Appearance and Dimensions

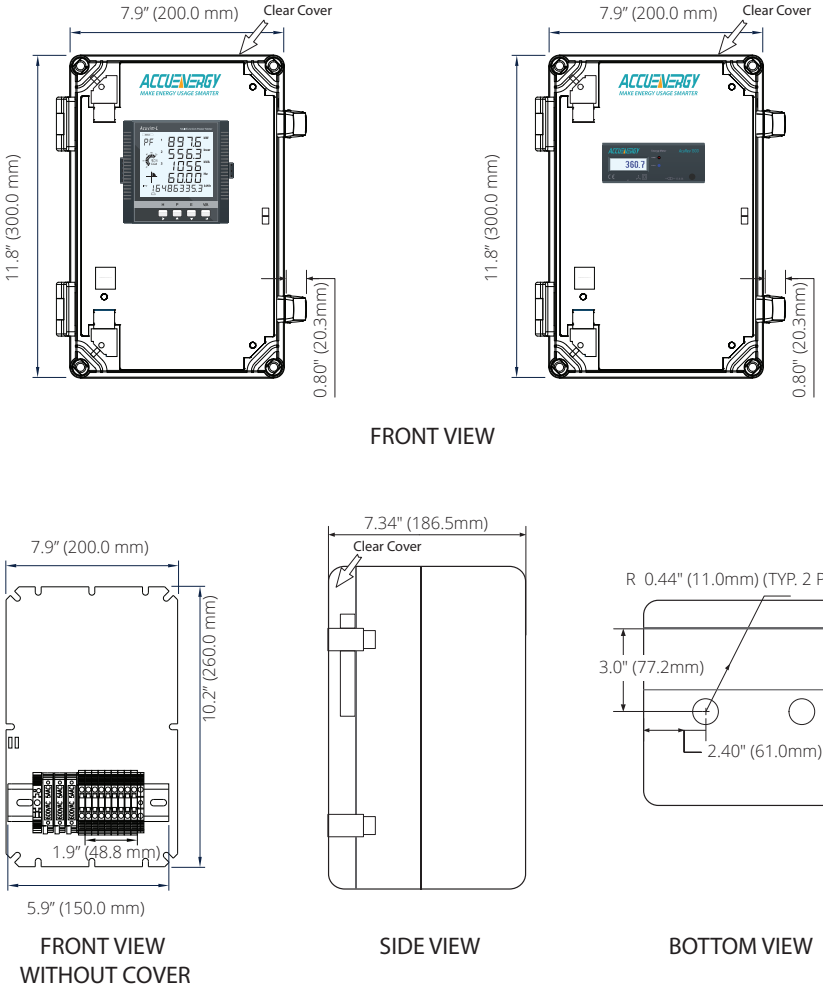



**Figure 2 AcuPanel 9104X Dimensions**

# Safety and Critical Installation Requirements



**Electrical Hazard**

Installation of AcuPanel 9104X must be performed by a qualified or licensed electrical personnel following proper electrical safety procedures.

**AcuPanel 9104X Installation Safety**

- Before commencing the wiring or service of the energy submetering panel, ensure to de-energize and lock out all the circuits.
- Short the secondary of the CT before disconnecting. Do not leave the secondary of the CT open on an energized conductor.
- Ensure the polarity of the CT aligns with the connected phase correctly.
- To reduce the risk of electric shock, always open or disconnect the circuit from the building power distribution system before installing or servicing current transformers.
- Verify the service is fully disconnected before making any voltage connections. Connect the common ground point of the AcuPanel 9104X to the facility grounding system.
- Ensure proper protective earthing and compliance with electrical safety standards.

# Panel Mounting Procedure

## Mounting Tools

| | |
|---|---|
| **1.** | Electric Drill |
| **2.** | Level |
| **3.** | Wire Cutters |
| **4.** | Side Cutters |
| **5.** | Conduit Knockout Punch Tools |
| **6.** | Grommets and Cable Retention |

## Typical Mounting Surfaces

Select a structurally suitable mounting surface that can support the weight of the enclosure and wiring including electrical distribution panels, electrical backboard, concrete or masonry walls, or other suitable surfaces, provided that the mounting surface complies with applicable electrical codes.

## Mounting the Panel

### Step 1: Select the Mounting Location

Choose a mounting location that is easily accessible, dry, and free from excessive vibration or heat. The NEMA 4X rated panel is suitable for indoor or outdoor use.

### Step 2: Mount the Enclosure

Mount the enclosure vertically on a wall using the four corner mounting lugs supplied.

### Step 3: Ensure Adequate Clearance

Ensure sufficient clearance around the enclosure for conduit entry and door swing.

### Step 4: Install Conduit Connections

Route all conduit connections through the knockouts at the bottom of the enclosure. Seal unused openings with appropriate fittings to maintain the NEMA 4X rating.

# 9104X Panel Wiring

### Factory Wired Connections

Control power, voltage reference, current input wiring from the meter to the panel terminals are pre-wired and tested at the factory level.

### Field-Wired Connections by Installer

The installer needs to carry out the external voltage, current transformer connection to the panel terminals and communication wiring to the meter terminals as described in the following sections.

## Voltage & Control Power Wiring



**Electrical Hazard**

De-energize the source panel before making any wiring connections.

Verify with a meter that all conductors are de-energized.

### Step 1: Connect the Load Voltage Reference

Connect the A, B, C load voltage reference leads and N to the panel terminal blocks labelled L1, L2, L3, and N in the AcuPanel 9104X.

The voltage reference will supply control power to the entire enclosure. No separate control power supply is required.

### Step 2: Install the Inline Fuses

It is recommended to install inline fuses with the voltage reference A, B, and C voltage lead connections for overcurrent protection.

### Step 3: Verify the Wiring Configuration

Select the correct wiring configuration for the monitored circuit type.

Refer to the corresponding wiring diagram on the inside of the enclosure door.

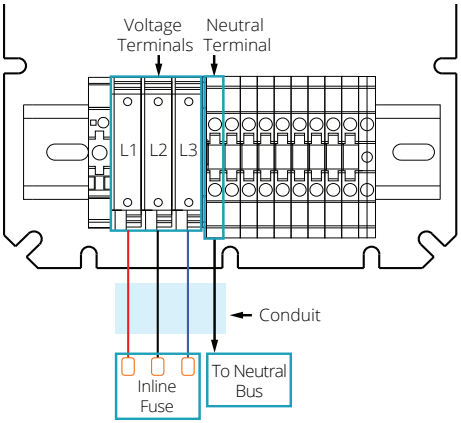



**Figure 3 Voltage Connection**

## Current Transformers Wiring

**Electrical Hazard**

Never leave CT secondaries open-circuited on energized conductors. Short the secondary terminals before removing any CT.

Current transformers (CTs) are ordered separately. Verify the CT model, ratio, and cable length before installation.

### Step 1: Installing the Current Transformers

Clamp or install selected CTs around each monitored conductor. Ensure to orient the CT polarity arrow points towards the load and away from the source. Follow the wiring diagram and instructions provided by the CT manufacturer.

### Step 2: Routing the Secondary Cables

Route the CT secondary cables through the conduit to the AcuPanel 9104X. Keep the CT leads away from high-voltage conductors to avoid interference.

### Step 3: Connecting the CT leads

Connect the CT secondary leads to the CT input terminals inside the panel, labelled CT1+, CT1−, CT2+, CT2−, CT3+, and CT3−.

For Rogowski coil CTs, connect the integrator output to the corresponding input terminal.

Ensure the coil overlap joint is properly closed around the conductor.

Compatible current transformers include 5A split-core or solid-core CTs, 333 mV split-core or Rogowski coil CTs, and 80 mA, 100 mA, 200 mA CTs.

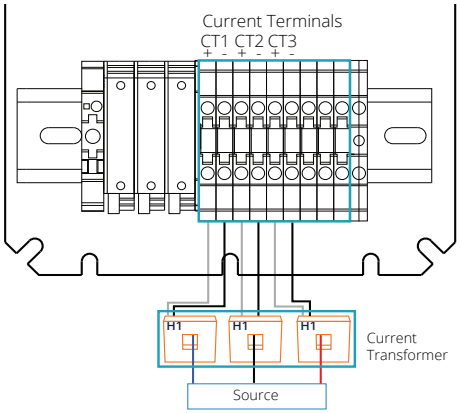



**Figure 4 CT Connections**

**Info**

The mA rated CTs are only applicable for AcuPanel 9104X installed with Acuvim II and Acuvim L multifunction meter.

Refer Current Transformers for further information.

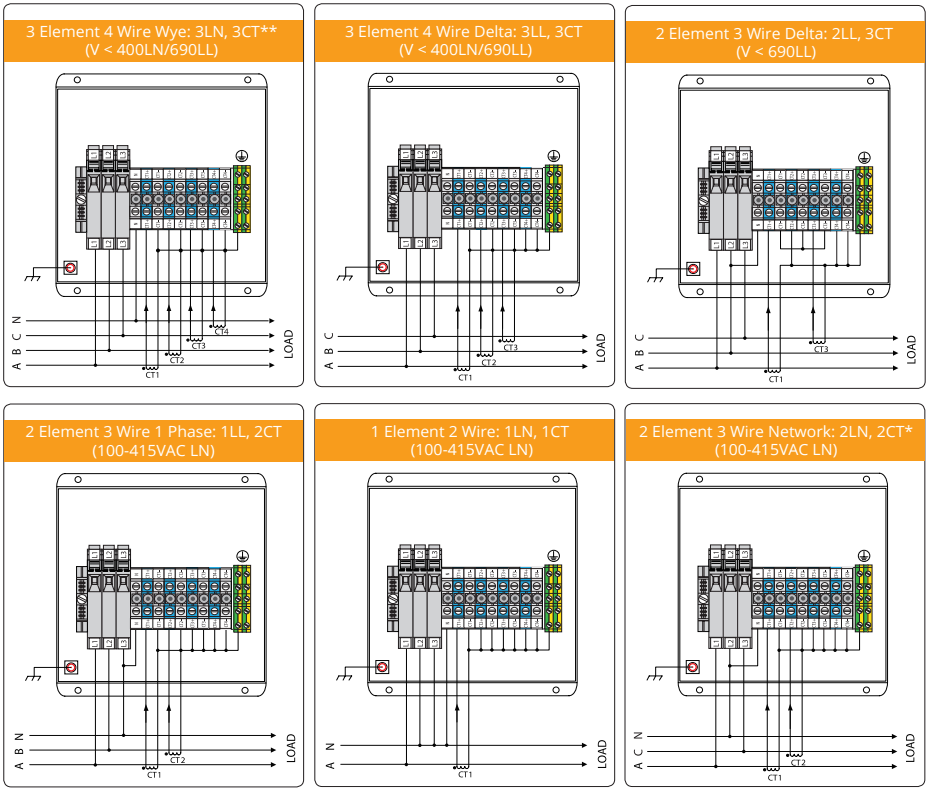



**Figure 5 AcuPanel 9104X Wiring Diagrams**

**Info**

* Wiring configurations are supported only by the Acuvim L and Acuvim II meters.

** Neutral CT is optional.

## Communications and I/O Wiring

### RS485 Wiring

#### Step 1: Connect the RS485 Wires

Connect the A+, B–, and S terminals on the rear of the Acuvim II or Acuvim L meter, or on the top of the DIN-rail-mounted AcuRev 1310 meter, to establish RS485 communication.

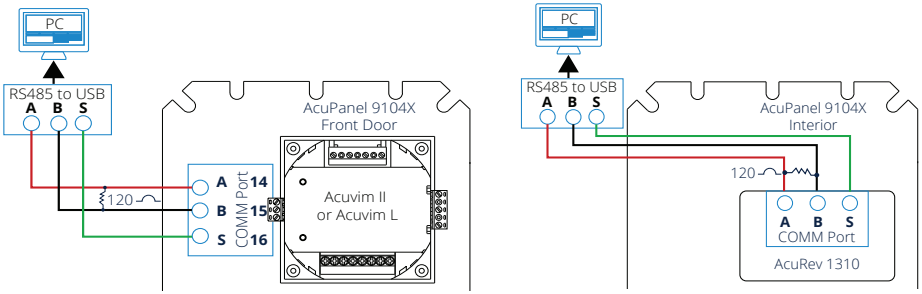
Ensure to check for correct polarity.

### Step 2: Terminate the RS485 Bus

Terminate the RS485 bus with a 120Ω resistor at each physical end of the bus if multiple devices are daisy-chained, as required by network configuration.

### Step 3: Connect the PC

Connect the RS485 network to a PC using an RS485-to-USB adapter for configuration and communication.




AcuPanel 9104X with Acuvim II or Acuvim L

AcuPanel 9104X with AcuRev 1310

**Figure 6 RS485 Connection**

### Acuvim II and Acuvim L Module Wiring

For connecting the optional communication and I/O modules to the applicable meters:

### Step 1: Route the Module Cables

Route the communication and I/O cables through the bottom of the AcuPanel 9104X.

### Step 2: Install the Communication Module

Connect the optional communication module to the meter before installing any I/O modules. The first module supports WEB2, WEB2-D, PROFI, RS485, IO1, IO2, or IO3 modules.

### Step 3: Install Additional I/O Modules

Install additional IO1, IO2, or IO3 modules in the second and third module positions. Up to three optional modules can be connected to a single meter, subject to the supported module combinations.

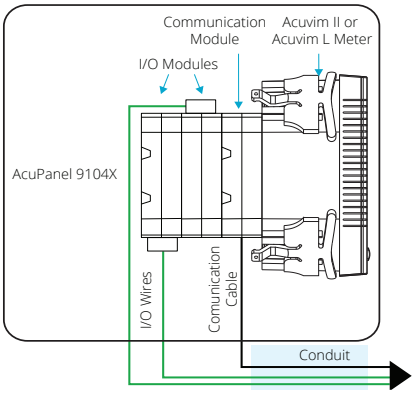



**Figure 7 Module Connections**

**Info**

Always connect the communication module to the meter first, before connecting any I/O modules.

Do not connect more than two of the same I/O module to a single meter.

### AcuRev 1310 I/O Module Wiring

#### Step 1: Route the I/O Wires

Route the I/O wires through the designated holes at the bottom of the AcuPanel 9104X.

#### Step 2: Connect Relay Outputs

Connect the relay output wires to the R1 and R2 terminals of the AcuRev 1310 meter.

#### Step 3: Connect Pulse Inputs

Connect the pulse-counting wires to the P1 and P2 terminals of the AcuRev 1310 meter.

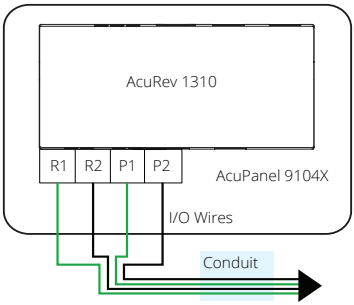



**Figure 8 I/O Module Connection**

## Ground Connection

### Step 1: Locate the Common Ground Terminal

Locate the factory-installed common ground terminal inside the AcuPanel 9104X enclosure. All internal components are pre-wired to this ground point at the factory.

### Step 2: Connect to Facility Ground

Connect the panel's common ground terminal to the facility grounding system in accordance with applicable local electrical codes to complete the ground path.

### Step 3: Verify the Ground Connection

Verify that the ground connection is secure and provides a continuous grounding path before energizing the panel.

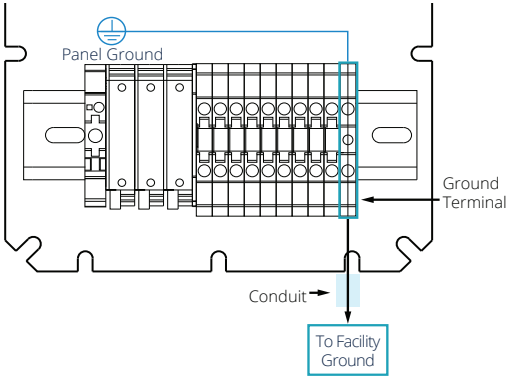



**Figure 9 Ground Connection**

# Network Integration

The AcuPanel 9104X can be integrated into Building Management Systems (BMS), Energy Management Systems (EMS), or an AcuLink 810 gateway for centralized monitoring. Select an integration path based on the communication interface and optional modules installed.

| Communication Interface / Optional Module | Integration Path | Connection Requirements |
|---|---|---|
| RS485 | Modbus RTU | Set the Address and Baud Rate to Match the Master Device. |
| RS485 | BACnet MS/TP | Set Communication Mode to BACnet and Set Address, Baud Rate to Match the Master Device. |
| RS485 | AcuLink 810 Gateway | Used for Local Data Storage and Web Interface Access. |
| WEB2 / WEB2-D | Modbus TCP | Ethernet Connection. |
| WEB2 / WEB2-D | BACnet/IP | Ethernet Connection. |
| WEB2 | DNP 3.0 / IEC 61850 / MQTT | Ethernet Connection. |
| PROFI | PROFIBUS-DP | PROFIBUS Connection. |
| WEB2 / AcuLink 810 | AcuCloud | Ethernet Connection.<br>Works as an Upstream Data Path to Cloud-Based Energy Management. |

# Commissioning Checklist

| Check | Acceptance Criteria | Result |
|---|---|---|
| Pre-Energization Checklist | • CT connections secure and correctly phased.<br>• Voltage wiring connections verified.<br>• Panel clean of tools and debris.<br>• All enclosure covers installed and latched. | Pass / Fail |
| Grounding | • Panel common ground terminal connected to facility ground. | Pass / Fail |
| Power-Up Verification | • Meter LCD illuminates upon power-up.<br>• Real-time parameters are visible.<br>• Voltage and current readings match expected values. | Pass / Fail |
| Phase & CT Verification | • Per-phase voltage, current, and power factor verified.<br>• Readings match connected load before final acceptance. | Pass / Fail |

# Post Power-Up Troubleshooting

| Observed Error | Possible Cause | Recommended Action |
|---|---|---|
| No Display | No Control Power | Check Voltage Wiring and Source Breaker. |
| Display Visible, but Readings are Zero | CT Leads Not Connected | Verify CT Secondary Leads are Connected to CT1 - CT3 Terminals. |
| Negative Power Reading | CT Installed Backwards or on Wrong Phase | Swap CT Polarity or Make Correction in Software.<br>Reassign Phases in Meter Configuration. |
| Zero Current Reading | Incorrect Wiring, Open CT Circuit, or CT Ratio Not Programmed | Check CT Connections.<br>Ensure CT Secondary Is Not Open-Circuited or Program the Ratio in Settings. |
| Voltage Mismatch | Wrong Phase Connection or Wiring Mode | Verify Wiring Configuration Matches the Actual Circuit Type. |
| Incorrect Energy Readings | Wrong CT Ratio or Phase Mismatch | Reconfigure CT Ratio.<br>Verify CT Phases Match Voltage Reference Phases. |
| Erratic Or Fluctuating Readings | CT Leads Near High-Voltage Conductors | Reroute CT Cables Away from Power Conductors. |
| No RS485 Communication | Incorrect Wiring Polarity, Wrong Address, or Baud Rate | Check RS485 A+ and B− Polarity.<br>Verify Modbus Address and Baud Rate Match the Master Device. |

# Accessing Energy Data

## On-Device LCD Display

The LCD of the meter provides real-time readings without any software. Available parameters include:

- Line and phase Voltage
- Per-phase and total current
- Active, reactive, and apparent power
- Power factor
- Frequency
- Cumulative energy, kWh import and export
- Harmonics and THD on supported Acuvim II and L models

## Phase & CT Verification

The AcuPanel 9104X supports CT polarity correction through software configuration and no physical rewiring is required in most cases.

### Step 1: Verify Phase Readings

Check the per-phase voltage, current, power, and power factor readings against the expected values for the connected load. Confirm that the voltage and current measurements correspond to the correct phases.

### Step 2: Check CT Polarity

If a phase shows negative power or energy flowing in the wrong direction, use the CT polarity correction feature in the meter configuration to flip the CT orientation in software.

Verify that per-phase voltage, current, and power factor readings align with expected values for the connected load before accepting final commissioning.

## Meter Configuration

If manual configuration is required, the following settings must be programmed on the meter:

- **Wiring Mode:** Set to match the monitored circuit type.
- **CT Ratio:** Set to match the primary rating of CTs.
  Example: For a 200A:5A CT, set the primary rating to 200 A, and 5 A as secondary.
- **Communication Address:** Assign a unique Modbus device address.
  The default address is 1.

# Product Specifications

| AcuPanel 9104X Specification | Description |
|---|---|
| Enclosure | NEMA 4X Polycarbonate |
| Dimensions | 200 mm × 300.0 mm × 186.5 mm<br>7.88" (W) × 11.81" (H) × 7.34" (D) |
| Compatible Meters | Acuvim II Series<br>Acuvim L Series<br>AcuRev 1310 Series |
| Current Inputs | Single, Two, or Three-Phase Circuits |
| CT Input Types | 5A or 1A<br>333 mV or Rogowski Coil<br>80 mA, 100 mA, 200 mA (Field Selectable, Acuvim II and Acuvim L only) |
| Nominal Voltage | Up to 400 V L-N / 690 V L-L |
| Control Power | P1: 100 - 415 VAC, 50/60 Hz, 100 - 300 VDC<br>P2: 20 - 60 VDC<br>P3: 480 VAC<br>P4: 600 VAC |
| RS485 Port | 1 Modbus RTU |
| Protocols | RS485 includes Modbus RTU, BACnet MS/TP<br>Optional Communication Module includes Modbus TCP, BACnet/IP, DNP 3.0, IEC 61850, PROFIBUS-DP |
| Display | LCD |
| Operating Temperature | -25°C to +70°C<br>-13°F to +158°F |
| Certifications | UL 508A, UL 61010-1 |

# Support & Resources

| Resource | Details |
|---|---|
| Product Datasheet | www.mod-tronic.com |
| User Manuals | Acuvim II User Manual: www.mod-tronic.com<br>Acuvim L User Manual: www.mod-tronic.com<br>AcuRev 1310 User Manual: www.mod-tronic.com |
| Firmware Updates | www.mod-tronic.com |
| AcuCloud Login | acucloud.accuenergy.com |
| Commissioning | Remote or on-site programming available. |

### Accuenergy Commissioning Service

Accuenergy provides on-site or remote commissioning for all AcuPanel systems.

Contact sales@mod-tronic.com to request services.

ACCUENERGY

MAKE ENERGY USAGE SMARTER

For additional help please reach out to:


Mod-Tronic Sales
Email: sales@mod-tronic.com
Tel: 1-800-794-5883

Mod-Tronic Technical Support
Email: sales@mod-tronic.com
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Revision Date: October 2026 Version: 1.0.0


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