Residential Electrical Metering
Advanced ANSI metering for the Smart Grid

Aclara’s I-210 product line continues the tradition to bring innovative and flexible technology solutions that cover all your metering needs from basic electronic energy-only meters to highly-flexible smart metering solutions that provide advanced functionality to meet the evolving Smart Grid system needs.

Aclara’s family of meters go beyond meeting your complex business challenges. The advanced, powerful and easy-to-use meters give you an extra edge in the energy business. You can look forward to realtime instrumentation, power quality monitoring and easy access to critical information. All these add up to give you higher productivity, improved efficiency and reduced energy costs.

KEY BENEFITS

- Reliable and accurate cash register for utilities
- AMR/AMI Plug-n-Play functionality
- Multiple communication technologies tied to AMI systems provide reliable data in a timely manner
- Smart metering functions such as Time of Use demand metering and service switch capabilities
- Demand side management through pre-payment and demand limiting features
- Advanced functions such as reactive measurement and, IEEE reliability indices measurement
- Robust meter security and standards compliance

COMMUNICATIONS

- Broad AMI/AMI Plug-n-Play options - RF Mesh, Power line carrier, Cellular, etc
- Allows interchangeability of AMR/AMI Plug-n-Play options
- Supports connectivity and integration with 3rd party communications solutions providers

Single Phase Meters

I-210+c
FULL FEATURED, SMART GRID ENABLED METERING
This is Aclara’s flagship residential meter product, offering demand, load profile, TOU, service switch, and a full complement of communication options.

I-210+
VALUE PACKED SMART GRID FUNCTIONS
World class accuracy and reliability in a solid-state kWh meter platform package. Available with a service switch, as well as a wide array of communications options.
SMART CONFIGURATION
- Ability to customize advanced metering options to suit customer’s needs
- Configure load profile, time of use and demand metering capabilities
- Versatile programming Softswitches allowing the selection of advanced functionality such as power quality measurement and reactive power measurement
- Service Switch option improves operational efficiency and addresses issues such as demand side management, remote repayment systems, and controlled outage restoration

RELIABILITY
- Robust revenue-grade watt-hour and demand meters
- Based on Aclara’s cutting edge technology providing typical 0.2% accuracy, and reliability
- Enable utilities with tools to lower operational cost and provide accurate metering solutions

RELIABLE METERING
In this dynamic time of regulatory scrutiny and customer engagement, you can be assured of the product and the company behind the product. We have ANSI and ISO certified labs to ensure that our product design and manufacturing processes yield a robust product every time.

Our testing procedures go well beyond the ANSI and IEC requirements for which we design to, including some of the most aggressive internal standards in the market place today. We now have included world-class Radio Frequency (RF) communications expertise to ensure that our meter products are hardened to withstand even the harshest of RF environments without sacrificing the quality or integrity of the metrology or the communications technology.

ACCURATE & DEPENDABLE
Typically measured at +/- 0.2%, the Aclara I-210 family of meters provides best-in-class capabilities for accuracy. Combined with the low starting watts, the utility can have confidence in the metered value and measured electricity usage.

INTEGRITY OF SUPPLY
Having a partner that can provide assurance in supply is critical when a utility begins a mass deployment of meters. Aclara’s process focus and rigor around supply chain excellence minimizes the risk to the utility, giving them confidence to manage installation crews and provide accurate scheduling to customers.

BROAD COMMUNICATIONS SUPPORT
The I-210 family has been designed to allow for the interchangeability of AMR/AMI modules and cover the broadest range of possible AMI communication technologies including RF Mesh, Cellular, Power Line and Ethernet. Modules can be added at the Aclara factory, after the fact, or replaced with another compatible module if the meter is redeployed.

ACLARA’S iiDEAS® OPERATIONAL DATA MANAGEMENT PLATFORM
iiDEAS integrates head-end and meter data management into one unified application. Iideas aggregates AMI meter data with existing utility applications and offers a single, customizable interface for personnel to access the critical data they need to better manage their distribution infrastructure, optimize operations and improve service reliability.

AMI meter data is significantly enhanced by the aggregation of data from such systems as GIS, OMS, CIS and SCADA. iiDEAS uses standard interfaces such as MultiSpeak and CIM to integrate with these systems. iiDEAS also provides a range of advanced analytics including loss analysis, transformer analysis, voltage analysis and fault detection and localization.
Residential Electrical Metering

Full featured, Smart Grid Meter

I-210+c

SMART GRID ENABLED, CONSUMER FRIENDLY METERING

Aclara’s most advanced residential electricity metering product line, the I-210+c, delivers Smart Grid capability for today and the future. Derived from our industry leading commercial and industrial product line, the kV2c, the I-210+c benefits from our advanced metrology capability and lessons learned from over 10 years of solid state metering design. All the way down to the advanced microprocessor, the I-210+c contains much of the advanced polyphase functionality that Aclara has been known for. We have also added capability that makes the I-210+c the referenced residential product line in the industry.

CAPABILITY

Designed for today’s dynamic rate structures, the I-210+c provides capability for demand, load profile, and TOU recording, along with a number of other power quality and demand response related functions. Configurable to support various metering quantities, this meter supports delivered (+), received (-), and net metering for distributed generation.

ADVANCED FUNCTIONALITY

With the addition of the fully rated 200 amp service switch, the meter is capable of pre-payment metering without all the historical cost associated with card readers or other legacy pre-payment technology. Load limiting and emergency conservation modes set this meter apart when working in conjunction with a demand response program. Having the capability to be remotely configured, as well as being firmware upgradeable, this product serves today’s needs, as well as tomorrow’s evolving requirements.

COMMUNICATIONS

Designed to specifically accommodate the communications technology required to support a Smart Grid, the I-210+c has the same electrical and mechanical interface as our I-210+ platform, making communications interchangeable and interoperable between these two residential metering platforms.

FEATURES & BENEFITS

- Customize advanced metering options through SoftSwitches
- AMR/AMI Plug-n-Play designed to accommodate:
  - Radio Frequency Mesh (RF Mesh)
  - Radio Frequency Point-to-Multipoint
  - Cellular communications
  - Ethernet
- Advanced functionality such as:
  - time-of-use, insensitive demand, load profile recording, event logging, voltage sag/swell recording
- Typical accuracy: within +/- 0.2%
- Service Switch to improve operational efficiency and address issues such as:
  - Demand side management
  - Remote prepayment systems
  - Controlled outage restoration
- Low starting watts; capture energy consumption at levels typically not registered by electromechanical meters
- Low burden, which minimizes utility system losses
- Patented tamper algorithm to detect tamper-by-meter inversion
- Meets or exceeds ANSI C12.1, C12.10, C12.20, C37.90.1 and and UL 2735

AMR/AMI PLUG AND PLAY COMMUNICATIONS

Multiple communication options on the I-210+c allows greater customer choice. Ideally optimized for RF Mesh, PLC, 3G/4G point-to-point communication technologies, the I-210+c can cover a wide variety of communication scenarios.
Residential Electrical Metering

Value packed, Smart Grid Meter

I-210+

LOAD MANAGEMENT

The I-210+ is one of the most popular single phase meters among US utilities for residential metering installations. Equipped with a fully-rated 200A service switch, this meter platform is ideal to provide basic load management functionality.

RELIABILITY

The I-210+ has enjoyed tremendous success in the marketplace for smart meters, with over 10 million units shipped since 2009. This product is the industry benchmark for quality and reliability, having passed both internal and external validation tests for billing accuracy. At Aclara, we have an unprecedented testing and validation process to ensure that our products are robust and exceed the industry standard ANSI requirements.

We have substantial expertise in wireless communications and the testing that is required to ensure that our meters perform flawlessly, even in the harshest of radio frequency (RF) environments.

COMMUNICATIONS

The I-210+ has the same electrical and mechanical interface as our I-210+c platform, designed to specifically accommodate Smart Grid communications technology, making communications interchangeable and interoperable between these two residential metering platforms. Multiple RF Mesh and PLC communication technologies are supported with a newly updated power supply.

FEATURES & BENEFITS

- AMR/AMI Plug and Play designed to accommodate: RF Mesh, RF Point-to-Multipoint, PLC, Ethernet
- Typical accuracy: within +/-0.2%
- Service Switch to improve efficiency and address:
  - demand side management
  - remote prepayment systems
  - controlled outage restoration
- Low starting watts; capture energy consumption at levels
- typically not registered by electromechanical meters
- Low burden, which minimizes utility system losses
- Meet or exceeds ANSI C12.1, C12.10, C12.20, C37.90.1

Factory Integrated Communication Options for I-210+ and I-210+c Meters

<table>
<thead>
<tr>
<th>AMI Technologies</th>
<th>Type</th>
<th>I-210+</th>
<th>I-210+c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aclara TWACS</td>
<td>PLC</td>
<td>•</td>
<td></td>
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<tr>
<td>Aclara Synergize® RF</td>
<td>RF P2MP</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Itron Single ERT HP (54-56ESS)</td>
<td>1-way RF AMR</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Itron Triple ERT HP (57ESS)</td>
<td>1-way RF AMR</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Itron EVDO &amp; HSPA</td>
<td>Cellular (3G)</td>
<td>•</td>
<td></td>
</tr>
<tr>
<td>Sensus Flexnet™</td>
<td>RF P2MP</td>
<td>•</td>
<td></td>
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<tr>
<td>Silver Springs Networks© NIC 410</td>
<td>RF Mesh</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Silver Springs Networks© NIC 510</td>
<td>RF Mesh</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Silver Springs Networks© MicroAP</td>
<td>Cellular &amp; RF Mesh</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Trilliant RPMA</td>
<td>RF P2MP</td>
<td>•</td>
<td>•</td>
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<tr>
<td>Trilliant SecureMesh™</td>
<td>RF Mesh</td>
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Note 1: Optional UL Certified Meter
Full featured, Secure Metering Software

MeterMate

SMART GRID ENABLED, CONSUMER FRIENDLY METERING

Aclara’s innovative MeterMate™ software suite enables meter administrators to easily configure and manage Aclara meters. Each software component in the MeterMate suite is optimized to address the different aspects of a meter’s lifecycle. MeterMate program creation software enables the user to effortlessly configure the meter’s basic and advanced functionality, ranging from creating a simple demand program and setting up the meter display to configuring the meter’s I/O and alerts. With MeterMate reading and programming software, a user can read, program and perform real-time instrumentation and power quality monitoring on a meter, via a variety of different communication methods such as local OPTOCOM, remote telephone, RS-232/485 and IP communications.

The MeterMate software also supports many functions such as:

• Analysis of load profile data
• Firmware upgrades
• Exporting of meter data to the MV-90 HHF format
• Configuration for automatic remote meter reading
• Direct table reads
• Conversion of meter configuration to an XML file format for AMI over-the-air configuration
• Comparison of a configuration from the database to a configured meter
• Opening and closing the meter service switch
• Importing and exporting of load profile data, event log data, configurations and security codes

FEATURES & BENEFITS

• One software suite to configure and read from the Aclara portfolio of meters: kV family, I-210 family and SGM3xxx family
• Supports the ANSI C12.19 communication protocol
• Multiple methods to communicate with meters: USB & RS232 OPTOCOM, RS485, Modem
• Modular configuration workflow that enable the reuse of frequently used configuration settings and measurements
• Various reports to display information for meter management, auditing, billing and monitoring power quality
• Command line interface and batch-control enabling automated and scheduled meter operations
• Configurable role-based access control security
## Residential Electrical Metering

### Residential Meter Selector

<table>
<thead>
<tr>
<th>Product Characteristics</th>
<th>I-210+ Basic Energy</th>
<th>I-120+c</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meter Functionality</strong></td>
<td></td>
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<tr>
<td>- Real Energy Consumption Management</td>
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<table>
<thead>
<tr>
<th>ANSI Models</th>
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<tbody>
<tr>
<td><strong>FORM</strong></td>
</tr>
<tr>
<td>1S</td>
</tr>
<tr>
<td>2S</td>
</tr>
<tr>
<td>3S &amp; 3CS</td>
</tr>
<tr>
<td>4S</td>
</tr>
<tr>
<td>12S</td>
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<tr>
<td>25S</td>
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<table>
<thead>
<tr>
<th>Soft-Switches to upgrade meter function</th>
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</thead>
<tbody>
<tr>
<td>• Optional Softswitches can be loaded in the factory or by the user to activate advanced functions</td>
</tr>
<tr>
<td>D — Activates communication capability with AMR/AMI modules</td>
</tr>
<tr>
<td>T — Simple Voltage Event monitor in addition to display of RMS momentary voltage on the 3 lower LCD digits</td>
</tr>
<tr>
<td>V2 — Simple Voltage Event monitor in addition to display of RMS momentary voltage on the 3 lower LCD digits</td>
</tr>
<tr>
<td>O — Activates AMI/AMR calculated demand displayed on meter LCD</td>
</tr>
<tr>
<td>A2 — Simple Voltage Event monitor in addition to display of RMS momentary voltage on the 3 lower LCD digits</td>
</tr>
<tr>
<td>• Customer can change selection later using MeterMate</td>
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<table>
<thead>
<tr>
<th>AMR Interface (Factory enabled or installed by customer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Quadrature Pulse</td>
</tr>
<tr>
<td>• SPI Format-1 data</td>
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<tr>
<td>• SPI Format-2 data</td>
</tr>
<tr>
<td>• PSEM Communications</td>
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<thead>
<tr>
<th>Energy Accumulation</th>
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<tbody>
<tr>
<td>• Must specify at time of order either:</td>
</tr>
<tr>
<td>- Delivered only kWh</td>
</tr>
<tr>
<td>- Received only kWh</td>
</tr>
<tr>
<td>- Delivered + received kWh</td>
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<tr>
<td>- Delivered – received kWh</td>
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<tr>
<td>- Lagging only kvarh; requires K2 Soft-switch</td>
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<tr>
<td>- Leading only kvarh; requires K2 Soft-switch</td>
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<tr>
<td>- Lagging + Leading kvarh; requires K2 Soft-switch</td>
</tr>
<tr>
<td>- Phasor apparent VAh; requires K2 Soft-switch</td>
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<tr>
<td>• Customer can change selection later using MeterMate</td>
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</tbody>
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<thead>
<tr>
<th>Cycle Insensitive Demand</th>
</tr>
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<tbody>
<tr>
<td>• Not available</td>
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<tr>
<th>Power Quality</th>
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<tbody>
<tr>
<td>• With V2 Softswitch enabled, provides a count of Sag/Swell Events. Value and duration thresholds are programmable</td>
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<table>
<thead>
<tr>
<th>Back-up power</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Not available</td>
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<table>
<thead>
<tr>
<th>Service Switch (provide remote controllable disconnection and reconnection of electrical service for residential applications)</th>
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<tbody>
<tr>
<td>• A switching device intended to provide remote controllable disconnection and reconnection of electrical service for residential applications</td>
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<tr>
<td>Note: Energy conservation demand limiting and prepayment metering functionalities are not available on forms 12S and 25S.</td>
</tr>
</tbody>
</table>
## Technical Specifications

### I-210+ c

#### Basic Functions
- Single Phase Demand Meter
- Energy management, 4 quantities
- Load Profile recording
- Time of Use Billing Measures
- Four Energy options (Delivered, Received, Delivered+Received, Delivered -Received)
- Tamper detect capability
- Broad communication module options
- Network applications
- Models available for 120 or 240 volt CL 20, CL 100, 200, CL 320 applications.

#### Optional Functions
- Factory integrated Service Switch Capability

#### Soft-Switch Functions
- The Alternate Communication Soft-switch allows a communication option board to communicate with the meter.
- Event Log Soft-switch allows the meter to track the most recent 200 events. Use MeterMate™ Program Manager, Diagnostics Editor, to select the event types to be logged and how many occurrences should be tracked, up to a maximum of 200 events. Date and time stamps are included on logged events for Demand/LP or TOU meters.
- Soft-switch allows billing demand calculations.
- Voltage (L-N): VA (max, min store) for summations, demand, and load profile recording.
- RMS voltage measurement for reading and display.
- Low potential caution.
- Temperature (max, min, avg) load profile recording.
- The Alternate Communication Soft-switch allows a communication option board to communicate with the meter.
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- Temperature (max, min, avg) load profile recording.

## Accuracy

- **Typical Accuracy:** Within +/- 0.2%
- **Starting Watts:** 12W @ 240V, 6W @ 120V
- **Typical Watt Loss:** 0.7 Watts

## Rating

- **Voltage:** 120V – 240V
- **Current:** Class 100, Class 200, Class 320, Class 20
- **Frequency:** 50 or 60 Hz

## Cover Options

- Polycarbonate over with molded sunshield.
- Plain cover without RESET latch and “D” ring.
- With Opticom “D” ring.
- With RESET latch and “D” ring.

## Operation Range

- **Voltage:** +/- 20%
- Operating over a broad temperature range (-40C through +85C under the cover)

## Available Models

- ANSI Form 1S, 2S, 3S, 4S, 12S, 25S
- CL20, CL100, CL200, CL320

## Applicable Standards

- Performance meets or exceeds industry standards
- ANSI C12.19
- ANSI C12.1
- ANSI C12.10
- ANSI C12.20
- ANSI C37.90.1
- UL 2735

## LCD Display

- 6 large characters to display the main programmed metering quantities

## Weights and Dimensions

### Dimensions

- **6.94 in. Max**
- **5.25 in. Max**

### Approximate Weight

- **Meters with service disconnect**
  - Individual meter: 2.0 - 2.4 lbs
  - 4 meter pack: 9.0 - 10.6 lbs
  - Pallet (120 meters): 285 - 340 lbs
- **Meters without service disconnect**
  - Individual meter: 1.3 - 1.7 lbs
  - 4 meter pack: 6.2 - 7.8 lbs
  - Pallet (120 meters): 200 - 255 lbs
Aclara is a world-class supplier of smart infrastructure solutions (SIS) to more than 800 water, gas, and electric utilities globally. Aclara SIS offerings include smart meters and other field devices, advanced metering infrastructure and software and services that enable utilities to predict and respond to conditions, leverage their distribution networks effectively and engage with their customers. Aclara is owned by an affiliate of Sun Capital Partners.

Visit us at Aclara.com, phone 800 297 2728 or contact us at info@aclara.com and follow us on Twitter @AclaraSolutions.

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