SmartSynch®
we create smart grids™

I-210+c® SmartMeter

SmartSynch's residential smart metering solution features a communications module that is integrated into the GE I-210+c electricity meter. The I-210+c SmartMeter communicates over an existing cellular network with the SmartSynch Transaction Management System™ (TMS) or other C12.21 head-end system (such as MV-90) and complies with ANSI C12.19 protocols for data storage and transmission.

The I-210+c SmartMeter is a single-phase electronic watt-hour meter for use in residential and light commercial service locations. The I-210+c's key features include Time of Use, Demand and Load Profile, Remote Connect/Disconnect, and C12.22/C12.21 compatibility. The I-210+c SmartMeter also includes an optional ZigBee® wireless component for in-premise communications and an optional Badger ORION® wireless component for gas and water reads.

Functions & Features

Wireless Communications

- GPRS
- ZigBee®
- Badger ORION®

Advanced Metering Functionality

- Remote Disconnect/Reconnect
- Flexible Two-Way Data Retrieval
- Scheduled & On-Demand Reads
- Interval Reads (5, 15, 30, 60 minutes)
- Real-Time Interval Reads
- Automated Register, Self-Read & TOU
- Demand Resets
- Real-Time Meter Event & Alarm Retrieval
- Real-Time Power Outage & Restoration
- Service Diagnostics & Tamper Detection
- Tilt Detection
- Meter Clock Synchronization
- SmartMeter Status Display
- Automated Meter Registration
- Secure & Encrypted Data Transmissions
- Bi-Directional Metering
- Over-The-Air SmartMeter Module Firmware Upgrade

Supported Meter Forms

- Class 20: 3S, 4S
- Class 100: 1S
- Class 200: 2S, 12S, 25S
- Class 320: 2S
- See back page for Supported Forms with Remote Disconnect

Hardware Components

- Remote Disconnect/Reconnect
- Radio Control Module Board (RCM)
- Capacitor Storage Bank (CSB)
- GSM/GPRS Modem
- ZigBee Transceiver
- Badger ORION Receiver
- Internal Antenna

Operating Ranges

Temperature

- Operating: [-40°C, +85°C]
- Transmission (GPRS): [-40°C, +85°C]

Humidity

- 0% to 95% non-condensing

Accuracy

- Meets ANSI 12.20 for accuracy class 0.5%

Regulatory & Industry Specifications

- FCC Part 15 Class B
- ANSI C37.90.1 – 1989: (SWC)
- ANSI C12.20 (Class 0.5) – 1998
- PTCRB Certified
- Network Carrier Certified
- Measurement Canada Certified

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Functions & Features

Remote Disconnect/Reconnect

Remote connect and disconnect functionality is supported by the I-210+c single-phase SmartMeter, which has a load-limiting switch that can be used to shed overall load at the premise without regards to specific appliance. This 200-Amp switch may be used to throttle load at the premise to a specific maximum threshold or to perform remote disconnects and reconnects.

Flexible Two-Way Data Retrieval and Scheduled Data Collection

Users can execute all appropriate TMS functionality using user-configurable, SmartMeter-controlled schedules and TMS-controlled schedules and as well as on an on-demand basis.

Automated Interval Data/Energy Usage Retrieval

The I-210+c SmartMeter module retrieves and transmits interval data for 1 unique energy value for intervals as small as 5 minutes. Recorded events and exceptions with each interval are also transmitted to TMS, which interprets them and logs appropriate messages (e.g. time adjustments).

Real-Time Interval Reads

Real-time interval data acquisition enables utilities to implement Load Curtailment and Real Time Pricing (RTP) programs. With this functionality, the user can configure the SmartMeter module to transmit load profile data as often as every 15 minutes at interval completion.

Automated Register, Self-Read and TOU Retrieval

The I-210+c SmartMeter module is configured by TMS to read and transmit all or a subset of enabled registers, including totals, self-reads, maximum demand and time-of-use values.

Demand Resets

The I-210+c SmartMeter module executes Demand Resets using one of three methods: SmartModule-initiated schedules, TMS-initiated schedules or TMS on-demand requests.

Real-Time Meter Event and Alarm Retrieval

The I-210+c SmartMeter provides automatic real-time alarm reporting of all events defined in the ANSI C12.19 standard, including history and event codes, ANSI Standard status and manufacturer status alarms. Additionally, alarms received by TMS can be automatically routed via e-mail to a specific user or group of users using the TMS Message Routing Interface.

Real-Time Power Outage and Restoration Alarms

With built-in ultracapacitor energy storage, the I-210+c SmartMeter module will transmit a real-time “last gasp” notification when detecting an AC power outage without requiring the use of less reliable batteries. The I-210+c SmartMeter also notifies TMS when the AC power is restored and provides full configuration of these alarms based on user-defined durations.

Service Diagnostic and Tamper Detection Alerts

The I-210+c SmartMeter can report power service and wiring errors detected by the meter, including reverse polarity, cross-phase and energy flow, phase voltage deviation, inactive phase current, phase angle displacement and current waveform distortion. In addition, the SmartMeter can detect and report exceptions for the following tamper events: number of Demand Resets, Loss of AC power and reported power outages.

TMS configures a specific filter in the SmartMeter for each of these events, enabling the transmission of a corresponding alert only after the event is repeated a minimum number of times within a specific duration. TMS can also configure the SmartMeter to reset the event counter when the alert message is transmitted.

Functions & Features

Tilt Detection

The I-210+c SmartMeter can detect and report tilt events that occur when the SmartMeter is moved from its installation position.

Meter Clock Synchronization

If enabled, the SmartModule automatically adjusts the meter clock when the time deviation falls within user-defined lower and upper deviation boundaries based on a reference clock provided by TMS. If the deviation exceeds the upper boundary, the module reports the deviation via an alarm but does not correct the meter clock. If the deviation is less than the lower boundary, the module ignores the deviation.

SmartMeter Status Display

The I-210+c SmartMeter supports an optional LCD status sequence to display important SmartMeter indicators periodically. This status sequence includes the meter site coverage status, SmartModule firmware state and any SmartModule firmware warnings/errors enabling technicians to ensure proper installation of the I-210+c SmartMeters and allow field troubleshooting without any other tools.

Automated Meter Registration

The SmartMeter module automatically transmits a registration message to TMS when the meter is installed without requiring user intervention. This message permits TMS to create or update the meter record with validated information, ensuring accurate and automated record entries without user intervention.

Secure and Encrypted Data Transmissions

256-bit encryption is applied to all messages exchanged between TMS and the SmartMeter module, utilizing a unique meter-specific encryption key.

Bi-Directional Metering

The I-210+c SmartMeter is a bi-directional meter that supports Net Metering. Both received and delivered data metrics are stored in the meter and can be delivered to the utility as needed to support "green-credit" electricity programs for consumers who own renewable energy facilities or participate in vehicle-to-grid systems.

Over-The-Air SmartMeter Module Firmware Upgrade

TMS users with administrator privileges can remotely upgrade the I-210+c SmartMeter module firmware for one or multiple communication modules.

Transmission Efficiency

In addition to support for allowing users to filter the number of meter channels and types of diagnostics that are returned, all wireless messages are converted to binary and optimally compressed before transmission to ensure the most economical data processing rates. The compression ratio can be as high as 50% and overall data usage can be as little as 5% of the total usage of other wireless systems.

Automated ID Tracking

Barcode labels and important identifiers (e.g. ICC-ID / MS-ISDN) are attached to the integrated SmartMeter for tracking and troubleshooting purposes. The SmartMeter module manufacturer and meter integrator scan and track all device IDs accurately.

On-Demand Data Reads For Virtual Disconnect

Customers can perform virtual disconnects through TMS by retrieving a final read for one end-user and an initial read for a subsequent end-user. This function may also be used to perform meter "switch-outs."

Hardware Specifications

Hardware Component	Description
Radio Control Module Board (RCM)	32-bit ARM processor, 256K RAM, 512K flash
Capacitor Storage Bank (CSB)	Supplies peak power for data transmissions and all functions during power outages – no batteries required
GSM/GPRS Modem	GSM modem communicates with head-end using GPRS and SMS services
ZigBee Transceiver	Wireless component for in-premise two-way communications
Badger ORION Receiver	Wireless component for receiving gas and water reads
Internal Antenna	Flexible dual frequency GSM antenna for the modem

Temperature Ranges

Operating: [-40°C, +85°C]

Transmission (wireless): [-40°C, +85°C]

Humidity Range

0% to 95% non-condensing

Accuracy

Meets ANSI 12.20 for accuracy class 0.5%

Supported Meter Forms

Class 20: 3S, 4S
Class 100: 1S
Class 200: 2S, 12S, 25S
Class 320: 2S

With Disconnect

Class 100: 1S
Class 200: 2S, 12S, 25S
Class 320: 25S

Regulatory & Industry Certifications

FCC Part 15 Class B
ANSI C37.90.1 – 1989: Surge Withstand Capability (SWC)
ANSI C12.20 (Class 0.5) – 1998
PTCRB Certified
Measurement Canada Certified
Network Carrier Certified

Input/Output Signal or Interface	Definition/Values
Module Power Input Voltage	120 - 240 VAC
Meter Serial Interface	3.3V / TTL compatible asynchronous

Integration

The SmartMeter module is a fully integrated, under-the-cover option inside the I-210+c meter. The I-210+c SmartMeter is shipped as one complete unit, ready for field deployment.

Version and Compatibility Information

I-210+c Meter Hardware:	Supported meter forms, classes, and types, equipped with battery
I-210+c Meter Firmware:	Latest fully supported
SmartModule:	I-210+c GPRS SmartMeter Module
SmartSynch TMS:	Version 6.0 or higher

About SmartSynch: Headquartered in Jackson, Miss., SmartSynch has been developing successful Smart Grid *Intelligence* solutions for the utility industry since 2000. The company's clean-tech innovations in the two-way delivery of real-time energy usage data over cellular networks (AT&T, Rogers, etc.), in lieu of private network build-outs, have to date simplified SmartMeter deployments for 150 major North American utilities, while enabling green-energy initiatives and delivering significantly higher Returns on Resources.

Unlike proprietary, closed-architecture solutions, SmartSynch's SmartMeters represent *future-proof* investments in technology. The standards-based IP connectivity enabled in every SmartMeter deployed makes them adaptable and remotely upgradable to support today's sensor and communications needs, as well as tomorrow's opportunities, better than any alternative.