



SENTINEL® GPRS SmartMeter

SmartSynch's C&I metering solution features a communications module that is integrated into the Itron SENTINEL electricity meter. The SENTINEL SmartMeter communicates with a server running SmartSynch's Transaction Management System™ (TMS) and complies with ANSI C12.19 protocols for data storage and transmission.

This solution delivers actionable intelligence (critical usage and rate data) over secure public wireless networks (such as AT&T and Rogers Wireless) and the Internet – in lieu of cumbersome and expensive private networks. This makes mass deployments quicker, easier, and more scalable, providing a significantly greater Return on Resources (RoR) for utilities.

Unlike proprietary, closed-architecture solutions, the SENTINEL SmartMeter is essentially a future-proof investment in technology. Its standards-based IP connectivity makes it adaptable and field-upgradeable to support today's sensing and communications needs, as well as tomorrow's opportunities, better than any alternative.

Functions & Features

Wireless Networks

- GPRS

Key Functions and Features

- Flexible Two-Way Data Retrieval
- Scheduled and On-Demand Reads
- Automated Interval Read Retrieval
- Real-Time Interval Reads
- Automated Register, Self-Read and TOU Retrieval
- Instrumentation Profiling
- Current and Voltage Profiling
- Demand Resets
- Real-Time Meter Event and Alarm Retrieval
- Real-Time Power Outage and Power Restoration Alarms
- Demand Threshold Monitoring and Alarms
- Service Diagnostics and Tamper Detection
- Meter Clock Synchronization
- SmartMeter Status Display
- Automated Meter Registration
- Secure and Encrypted Data Transmissions
- Over-The-Air SmartMeter Module Firmware Upgrade
- Supports Reads from Itron MV-90 Software

Supported Meter Forms

- Class 20: 45S (5S), 46S (6S), 9S (8S), 10A and 45A
- Class 150: 16A (14A, 15A and 17A)
- Class 200: 2S, 12S and 16S (14S, 15S and 17S)
- Class 320: 2S, 12S, and 16S (14S, 15S and 17S)

Hardware Components

- Radio Control Module Board (RCM)
- Capacitor Storage Bank (CSB)
- GSM/GPRS Modem
- Interconnect Board
- Internal Antenna

External Antenna Option

- Omnidirectional Antenna (5 dBi gain)

Operating Ranges

Temperature

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

Humidity

- 0% to 95% non-condensing

Accuracy

- Meets ANSI 12.20 for accuracy class 0.2%

Regulatory & Industry Specifications

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

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Functions & Features



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 as well as on an on-demand basis.

Automated Interval Data/Energy Usage Retrieval

The SENTINEL SmartMeter module retrieves and transmits interval data for up to 8 unique energy values for intervals as small as 5 minutes. Recorded events and exceptions with each interval are also transmitted to the 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 interval data as often as every 15 minutes at interval completion.

Automated Register, Self-Read and TOU Retrieval

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

Instrumentation Profiling/Current and Voltage Profiling

The SENTINEL SmartMeter module retrieves and transmits up to 8 unique instrumentation values from 32 instrumentation sources, including Current and Voltage sources, for intervals as small as 5 minutes. Recorded events and exceptions with each interval are also transmitted to the TMS, which interprets them and logs appropriate messages (e.g. time adjustments).

Demand Resets

The SENTINEL SmartMeter module executes Demand Resets using one of three methods: SmartModule-initiated schedules, TMS-initiated schedules and TMS on-demand requests.

Real-Time Power Outage and Restoration Alarms

With built-in ultracapacitor energy storage, the SENTINEL 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 SENTINEL SmartMeter also notifies the TMS when the AC power is restored and provides full configuration of these alarms based on user-defined durations.

Real-Time Meter Event and Alarm Retrieval

The SENTINEL SmartMeter module provides real-time monitoring and reporting of meter diagnostic events including but not limited to: all SiteScan™ Diagnostics, demand threshold, meter reprogrammed configuration error, low battery, reverse rotation, low loss potential and demand overload alarms.

Demand Threshold Alerts

The SENTINEL meter can monitor up to 4 demand threshold quantities. The TMS can configure the SENTINEL SmartMeter to activate alerts for these demand threshold quantities and to transmit the corresponding alert only after a specific threshold is exceeded or restored. The SENTINEL meter supports 34 demand quantities, such as max watts delivered, max watts received, max VA delivered, max VA received, and max VAR delivered and max VAR received.

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 the 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.



Functions & Features



Service Diagnostic and Tamper Detection

The SmartMeter can report power service and wiring errors detected by the SiteScan feature of the SENTINEL meter. Monitored and reported events are: 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. The 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 of times within a specific duration. The TMS can also configure the SmartMeter to reset the event counter when the alert message is transmitted.

Over-The-Air SmartMeter Module Firmware Upgrade

The TMS administrator can remotely upgrade the SENTINEL SmartMeter module firmware for one or multiple GPRS modules. The TMS and each of these SmartMeters execute the download sequence after a compatibility check is performed. The TMS administrator is able to switch any of these GPRS modules to the new firmware once the SmartMeter communicates a successful download notification to the TMS.

SmartMeter Status Display

The SmartMeter firmware enables an optional display sequence on the SENTINEL meter to display important SmartMeter indicators. The meter displays the SmartMeter Status periodically based on meter display configuration and sequence. This display identified by the "SSI" prefix, shows the coverage status at the meter site, relevant SmartMeter firmware state, firmware errors and a field to display a message from TMS. The display values are updated as frequently as twice a minute. This powerful feature enables technicians to ensure proper installation of the SENTINEL SmartMeters and allows for field troubleshooting without any other tools.

Automated Meter Registration

The SmartMeter module automatically transmits a registration message to the TMS when the meter is installed without requiring user intervention. This message permits the 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 the TMS and the SmartMeter module, utilizing a unique meter specific encryption key.

Transmission Efficiency

In addition to meter channel and diagnostics filtering capabilities (see above), the TMS and SmartMeter module compress data and commands before transmission. Compression ratios vary depending on message contents and lengths (as high as 50%) to ensure the most efficient use of airtime.

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 have the ability to perform virtual disconnects through the TMS whereby a final read is issued for one end-user and an initial read is performed for a subsequent end-user. This function is also utilized to perform "meter replacements.



Hardware Specifications



Hardware Component

Description

Radio Control Module board (RCM)	Includes 32-bit ARM processor, 8 MB RAM, 2 MB flash
Capacitor Storage Bank (CSB)	Supplies peak power for data transmissions and all functions during power outages no batteries required
g24 modem	GSM modem communicates with the TMS using GPRS and SMS services
Interconnect board	Connects the SmartMeter module to the SENTINEL meter
Internal Antenna	Flexible dual frequency GSM antenna for the g24 modem
External Antenna kit (optional)	External GSM antenna & isolation circuit for the g24 modem

Temperature Ranges

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

Humidity Range

0% to 95% non-condensing

Accuracy

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Supported Meter Forms

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Regulatory & Industry Certifications

FCC Part 15 Class B
 ANSI C37.90.1 – 1989: Surge Withstand Capability (SWC)
 ANSI C12.20 – 1998
 PTCRB #9473 (SmartMeter Module)

Input/Output Signal or Interface Definitions/Values

Module Power Input Voltage	5 – 15 VDC
Module Input Current Limit	100 mA or 130 mA maximum
Continuous Power Consumption	300 mW
Meter Serial Interface	3.3V / TTL compatible asynchronous
Meter Option Interface	for KYZ board (optional)
Field Flash Upgrade Interface	Direct wired serial interface

The KYZ kit consists of the KYZ board, which plugs into the CPU board, and the KYZ cable assembly, which connects to the KYZ board and exits from the meter base. It provides one, two, or four KYZ outputs – one low current/high current (KY) output and two pulse or state inputs. No external wetting voltage source is provided.

Integration

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

Version and Compatibility Information

SENTINEL meter hardware:	Supported meter forms, classes and types equipped with battery.
SENTINEL meter firmware:	Revision 3.210 or later
Module:	SENTINEL GPRS SmartMeter module Rev 1.0, FW - SENTINEL GPRS 1.0 or higher
SmartSynch TMS:	Software version 4.0 or higher
PC-PR0+ Advanced:	Version 7.1 or higher (Optical Programming)

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 public wireless networks, in lieu of private network build-outs, have to date simplified SmartMeter deployments for over 100 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.