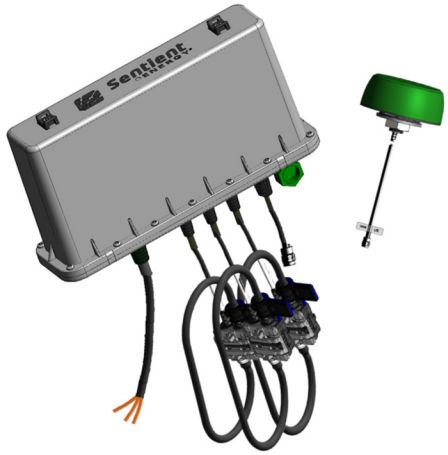
UM1™ Underground Line Sensor

The Sentient Energy UM1 underground line sensor extends the reach of our line sensing solution, the Grid Analytics System,™ to include underground residential distribution (URD). With more people working from home, increasing solar integration, and EV charging, it's now more important for utilities to monitor and improve the reliability of their underground residential system.



Purpose Built for URD

Specifically designed for single-phase transformer cabinets, the UM1 is compact and directly powered from the secondary side. The UM1 and its optional externally visible LED integrated with the antenna module are built for reliable operation in harsh outdoor conditions.

Fault Detection and Location

Sentient Energy's UM1 uses advanced fault detection algorithms to detect power system faults including permanent, momentary, and faults without interruption. Grid operators are notified of faults via cellular communications. With highly accurate fault information, dispatchers can more quickly guide crews to faulted cable runs resulting in reduced patrol times, faster restoration, and significant CAIDI and SAIDI improvements.

Fault Notifications

When a fault occurs, the UM1 sends alerts and pushes data to the Sentient Energy's Ample® Analytics Platform for visualization and analysis. The alerts and data from the UM1 can also be configured to stream into systems such as OMS and ADMS.

Flexible Product Configurations

Three levels of configuration are available on the UM1. Basic configuration provides monitoring load and faults on the primary side of the transformer plus GPS for location. An externally visible LED, which integrates with the antenna module, is added in the intermediate configuration. The advanced configuration adds monitoring load and faults on the secondary side of the transformer including sensing current direction.

Awareness of Load Levels and Current Direction

Bi-directional power flow associated with DERs such as rooftop solar makes estimating true load more challenging. To improve situational awareness for these residential circuits, the advanced configuration of the UM1 reports load levels and current direction at the transformer.

Transformer Overloading Detection

The advanced UM1 combines secondary voltage and current values with transformer metadata allowing utility engineers to determine true loading on transformers, identify overloading, and make more data-driven asset management decisions.

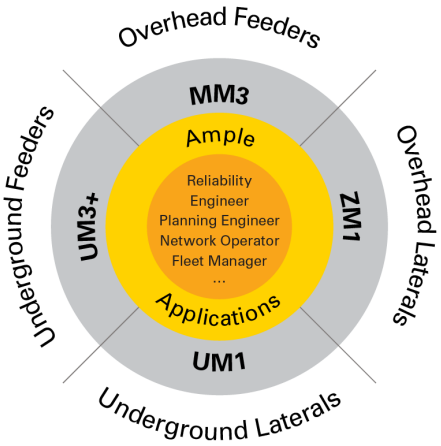
Power Theft Identification

Energy theft is a crime, can be very dangerous, and increases power costs for everyone. By comparing UM1 load data with AMI meter data utilities can identify potential front-of-the-meter power theft.

UM1™ Underground Line Sensor

A Complete Grid Analytics System

Sentient Energy's Grid Analytics System consists of the MM3™, ZM1™, UM3+™, and UM1™ line sensors, and the Ample Analytics Platform. Each sensor features fault detection and load monitoring capabilities, an LED indicator, GPS, and integrated cellular or mesh communications. The MM3 is used for overhead feeders and the ZM1 monitors overhead laterals as well as low load feeder segments. The UM3+ addresses underground feeders while the UM1 monitors underground residential distribution. All four sensors are designed to maximize the amount of system data gathered while transmitting only the necessary information.



Ample® Analytics Platform

Sentient Energy's Ample Analytics Platform is a comprehensive set of software tools that turn sensor data into actionable insights for network operators, reliability engineers, and planning engineers. In addition to providing data visualization and analytics, Ample streamlines sensor fleet management and integration of sensor system data into existing OT systems.

Key Characteristics

Monitoring Purpose	UM1 Basic – Primary load and faults UM1 Advanced – Load and faults on both primary and secondary
Monitoring Locations	Single-phase underground transformer cabinets
Wireless Communications	Cellular
GPS	Latitude/Longitude, precise time-stamping
Measurement Sample Rate	256 samples/cycle, continuous sampling
Load & Fault Measurement Accuracy	Load: +/- 0.1A from 1A – 25A, +/-1% 25A-600A; Fault: +/-1% up to 7kA
Continuous/Fault/ Withstand Currents	600A/7kA/25kA
Voltage Range	2.4 kV – 19.9 kV
Operating Temperature Range	-40°F to 185°F (-40°C to 85°C)
Power Requirements	Directly powered from secondary side, 56-525 VAC 50/60Hz
Product Dimensions	12"(L) x 6"(W) x 3"(H)
Externally Visible LED	Yes, integrated into the antenna module
Qualifications	ANSI®/IEEE 495-2007, FCC part 15 Class B, IP-68, ANSI C62.42 Class C
Availability/Reporting	100% available, configurable reporting, unsolicited alerts
Availability/Outage	Last gasp shutdown, LED up to 12 hours
Installation	Estimated time 15 minutes, energized install

UM1 at a Glance

Supported Use Cases

	Basic	Intermediate	Advanced
Load/Fault Monitoring (Primary/MV)	✓	✓	✓
GPS Location	✓	✓	✓
External Fault LED (Flash Duration)		✓ (4hrs.)	✓ (12hrs.)
Load/Fault Monitoring (Secondary/LV)			✓
Load Direction (Secondary)			✓
Monitor Transformer Detrimental Loading			✓
Front of Meter Theft Analysis			✓

Visibility, Analytics, and Control for a Better Distribution Grid

Sentient Energy®, a Koch Engineered Solutions company, is the premier provider of intelligent sensing, data analytics, optimization, and control technologies for the distribution grid. Sentient Energy's hardware and software solutions help electric utilities make data-driven decisions to enhance the delivery of safe, reliable, and efficient power. With the industry's only Grid Analytics System™ that covers the entire distribution network, Sentient Energy leads the global market with the largest network of line sensor deployments in North America, gathering rich data in real time for predictive insights and strategic grid management. Sentient Energy's Grid Edge Control solutions enable utilities to reduce energy costs at the grid edge through Volt-VAR optimization, conservation voltage reduction, and peak demand reduction. Sentient Energy partners with leading communications network providers. For more information visit www.sentientenergy.com.

January 2023