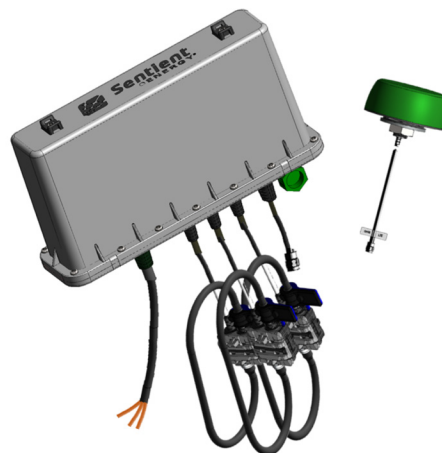




# UM1™ Underground Line Sensor

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 – Radial and Loop

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 certified for reliable operation in harsh outdoor conditions.

## Fault Detection

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.



## Estimated Fault Location

The UM1 can significantly cut down the fault finding and repair time by providing an estimated distance to fault from the nearest UM1. With a simple setup of cable and circuit impedance parameters, Ample calculates estimated fault location from the UM1 that was closest to the fault. Our distance to fault algorithm has been benchmarked to be at par or better than other manual distance to fault calculators in use today.

## 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.

## 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.

## Front of the Meter Theft Identification

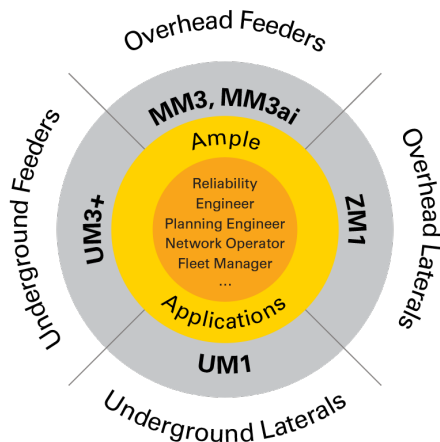
Energy theft is a crime, can be very dangerous, and increases power costs for everyone. By combining data captured by UM1 with AMI meter data utilities can identify potential front-of-the-meter power theft.



# UM1™ Underground Line Sensor

## A Complete Grid Analytics System

Sentient Energy's Grid Analytics System consists of the MM3, MM3ai, 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 and MM3ai are 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 five 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	Advanced
Load/Fault Monitoring (Primary/MV)	✓	✓
GPS Location	✓	✓
External Fault LED (Flash Duration)		✓ (12hrs.)
Load/Fault Monitoring (Secondary/LV)		✓
Load Direction (Secondary)		✓
Monitor Transformer Detrimental Loading		✓
Front of Meter Theft Analysis		✓

Sentient Energy, a Koch Engineered Solutions company, provides innovative distribution grid solutions and services to enable data-driven decisions that enhance the delivery of safe, reliable, and efficient power. With a vision to help orchestrate the transformation of the distribution grid, we partner with leading utilities to meet today's grid challenges while addressing the electrification needs of tomorrow.

Our grid modernization solutions offer rich system visibility, fault detection and load data, predictive insights, and dynamic VAR control for strategic grid management. And the Sentient Energy professional services team offers deep industry expertise to help utilities gain maximum value from their reliability and predictive analytics initiatives without putting a strain on internal resources.

For more information on how we help transform the distribution grid, visit [sentientenergy.com](https://www.sentientenergy.com) and follow us on [LinkedIn](#).