



UM3+™ Underground Line Sensor

The UM3+ intelligent line sensor is a field proven solution that can be retrofitted with existing switches in minutes.

The UM3+ extends the capabilities of the MM3™ and ZM1™ line sensors to underground circuits to detect, capture, analyze, and communicate accurate fault, non-fault disturbance, and load data for each phase. Its modular design offers utilities the ability to monitor up to twelve phases with one UM3+, whether it be in a padmounted switch cabinet or vault or ring main unit.



Deployment Versatility

The UM3+ can monitor three to twelve phases to support a range of underground installations including pad mounted transformers, pad mounted switch cabinets, ring main units (RMUs), and above grade vaults. There are three options to power a UM3+. Two options use power harvesting (with 1 or 2 harvesting cores) and the third option utilizes the AC power.

Proven Multi-Communications Solution

As with Sentient Energy's MM3 and ZM1 overhead devices, the UM3+ is designed to communicate using cellular carriers' LTE networks as well as mesh networks. This multi-communications capability has been deployed and proven in tens of thousands of devices in the field. The UM3+ supports Itron (SSN) and leading 4G/LTE carriers; additional communications options are available upon request. The UM3+'s local processing and advanced analytics capabilities reduce communications cost/burden by transmitting only key event information, in real time and by exception, while forwarding detailed data only upon request or when bandwidth is available.

SAIDI: Fault Detection and Location

Sentient's UM3+ uses advanced fault detection algorithms, and is capable of wirelessly communicating fault information immediately to the utility control center via SCADA/ DMS or OMS. With the fault information, operators can dispatch crews to the correct location based on an immediate alert notification, supported by visual indication which enables crews to confirm that they have arrived at the proper site.

Load Monitoring and Phase Balancing

Sentient Energy's UM3+ continually measures current values and determines the most useful values and averages for load monitoring purposes. This collected data is processed on the device itself to extract critical information and derive accurate line conditions. Average logging data and statistics (such as alerts and daily peaks) are reported back to Sentient Energy's Ample® Analytics Platform. This load information enables grid operators to adequately address phase imbalance. With visibility into network loading conditions, asset utilization is maximized by basing replacement decisions on accurate, real data rather than best-guess simulations or state estimations.

SAIFI: Fault and Disturbance Oscillography

Equipped with high-resolution waveform capability at a rate of 256 samples per cycle, Sentient Energy's UM3+ can capture and record fault and disturbance waveforms that occur in underground cables and underground equipment. Waveforms are used by grid analytics and disturbance management applications to identify probable fault causes. Complete fault event and disturbance waveform data is stored locally on the UM3+ and is available to download as and when needed.

Sentient Energy's Ample Analytics Platform

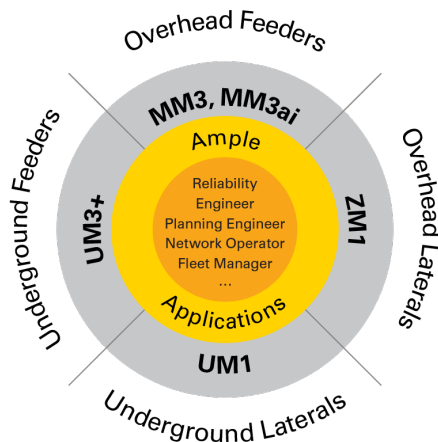
The Ample Analytics Platform provides complete sensor management for the UM3+ including remote configuration, firmware updates, and status. Ample also integrates sensor data into utility SCADA/ DMS/ADMS applications plus offers a user interface to visualize sensor fault, disturbance, and load data.



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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 Locations Phases/ Conductors	Padmounted switch cabinet, Vault, Ring Main Unit, Up to 12 conductors
Wireless Communications (WAN)	Mesh – Itron (SSN), Cellular: AT&T, Verizon; Other available upon request Communications Protocol: DNP3 ¹
Configuration and Software Upgrades	Remote over the air
Current, Fault Withstand	0 to 600A RMS operating, Up to 25kA RMS fault current
Waveform Capture	256 samples/cycle (15.3 KHz), continuous 24 x 7, 1st – 31st harmonics
GPS	Latitude/Longitude; precision time stamping
Operating Environment	-40°F to +185°F (-40°C to 85°C) Up to 35kV
Powering Options	Single harvest core with 12A or more, dual harvest cores with 8A or more, 100-240V AC
Conductor Size	1.5"– 2.4" (1000 KCMIL cable or smaller)
Physical Size and Construction	9.1"W x 14.4"L x 4.36"D
I-RF (Indication and Communications) Module Size	5.5" (Diameter) x 3.25" (Height)
Supported Switch Manufacturers	S&C, ABB, Hubbell, Federal Pacific, G&W, Trayer, Siemens
Qualifications	ANSI®/IEEE495-2007; FCC part 15 Class B, IP-67, ASTM B-117 salt spray, ASTM G 155 UV exposure
Event Notifications / LED	Immediate network messaging, LED FCI-type indicator and on enclosure system operational LEDs
Availability / Normal	100% available, unlimited 2-way communications
Availability / Outage	Typical 3-4 hrs. at ambient conditions, sensor and communications at full operation
Installation	Designed for ASTM B-117 Class 2 glove installation Magnetic and Bracket mount options available

¹DNP/IEC 60870-5-104 through concentrator



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](#).