Sentient ENERGY®

UM3+™

The UM3+™ Intelligent Sensor is a field proven solution that makes Sentient Energy's advanced grid analytics available for underground distribution circuits.

The UM3+ extends the capabilities of the MM3™ and ZM1™ line monitors to underground circuits to detect, capture, analyze, and communicate faults and non-fault disturbances. Its modular design offers utilities the ability to monitor up to twelve phases with one complete solution, whether it be in a padmounted switch cabinet or vault or ring main unit.

A Modular Approach to Monitor the Multifaceted Underground Distribution Grid
Underground equipment complexity ranges from simple underground padmounted transformers to intricate padmounted switch cabinets to the very tangled and challenging environments of underground vaults. These scenarios present significant obstacles in providing robust line monitoring solutions that communicate results over varying networks. Sentient Energy's UM3+ is the first modular solution available to address these challenges in various configurations of underground equipment. The intelligent sensor provides the flexibility to plug and monitor from three to twelve conductors as needed for a given location.

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 Advanced Metering Infrastructure (AMI) and Distribution Automation (DA) mesh networks, just. 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+ Grid Monitor app (cFCI®) uses advanced fault detection algorithms, capable of wirelessly communicating fault information immediately to the utility control center via SCADA/DMS or OMS. With cFCI®, 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.

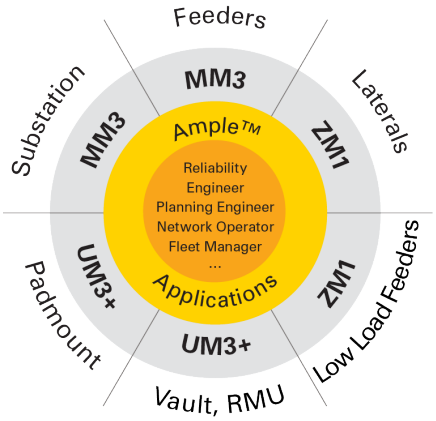
Load Monitoring and Phase Balancing
Sentient Energy's UM3+ Log-I app continually measures current values and determines the most useful values and averages for load monitoring purposes. This collected data is processed on the device itself to extract critical information and derive accurate line conditions. Average logging data and statistics (such as alerts and daily peaks) are reported back to Sentient Energy's Ample™ suite and Grid Analytics System™. This load information enables grid operators to adequately address phase imbalance. With visibility into network loading conditions gained from the Log-I app, 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 Applications and Disturbance Management applications to identify probable fault causes or identify failures before they cause outages. 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 Grid Analytics System™ provides analyses, reports and visualization tools that enable utilities to shift from reactive mitigation in restoring outages and repairing equipment to proactive identification of pre-fault anomalies to prevent outages.

Sentient Energy's Ample Analytics Suite
The Ample Analytics suite, along with the UM3+, empowers the utility operator to review waveforms and device health, and make desired modifications to data collection. UM3+ integrates seamlessly into Ample and provides critical information on lateral and low amp feeder lines.

A Complete Grid Analytics System

Sentient Energy's Grid Analytics System™ consists of the MM3,™ ZM1,™ and UM3+™ line sensors, and the Ample Analytics Platform. Our flagship sensor, the MM3, is an intelligent, high-performance sensor featuring substation class measurement, computing, and processing capabilities. The ZM1 sensor complements the MM3, making intelligent sensing and high-resolution data capture capabilities available at grid locations with low or no amperage. The UM3+ sensor further extends high-resolution sensing and distributed computing capabilities to the underground grid. These three sensors are designed to maximize the amount of system data gathered while transmitting only the necessary information.



Ample® Analytics

Ample Analytics provides everything needed to manage field monitoring devices and the data that they collect. Ample's modules extract essential insights from complex data, empowering operators, planners, and protection engineers to make timely and accurate decisions while managing the distribution grid.

Sentient ENERGY®

DETECT PREDICT DELIVER

A KOCH ENGINEERED SOLUTIONS COMPANY

Key Characteristics

Powerful Underground Platform for Advanced Monitoring and Analytics

Sentient Energy's UM3+ line monitor is equipped with sophisticated sensing and measurement capabilities including line and fault current measurement. The UM3+ uses GPS for location and time synchronization and precise time stamping of all measurements. The UM3+ also features patent-pending communications software that allows data transfers, software upgrades and configuration changes remotely over the air from the utility's control center even over constrained mesh networks.

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
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
Off Peak (10 Hrs. or Less) Line Current	8A, sensor and communications at full operation
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)
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

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.

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