



# Sentient UM3™

Sentient Energy's UM3™ Line Monitor is the next addition to our growing suite of intelligent sensors that makes advanced grid analytics available for underground distribution circuits for the first time.

Sentient's UM3™ extends the capabilities of the MM3™ and ZM1™ line monitors to provide equivalent capabilities to underground circuits to detect, capture, analyze and communicate faults and non-fault disturbances. The UM3's modular design allows utilities the ability to address their underground priorities such as padmounted switchgear or underground vaults, with one uniform solution.

## **A modular approach to address various types of complex underground requirement.**

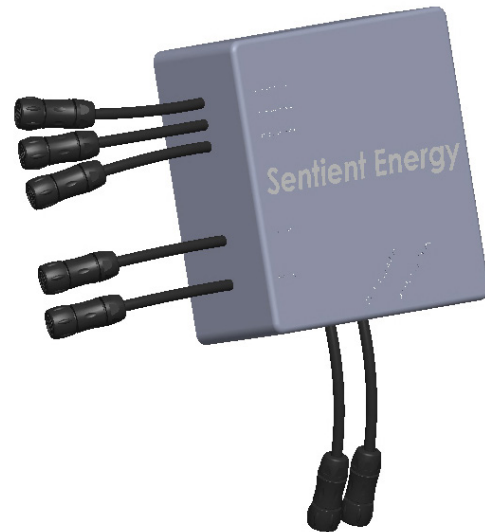
Underground equipment complexity ranges from simple underground pad-mounted transformers to somewhat complex pad mounted switch cabinets to the very complex and challenging environments of underground vaults and man-holes. Large numbers of cables in close proximity and often submerged, present significant obstacles in providing robust line monitoring solutions that communicate results over mesh and cellular networks. The Sentient UM3 is the first modular solution available to address these challenges in various configurations of underground equipment.

## **Proven Multi-Communications Solution.**

The UM3 is designed to communicate using either Advanced Metering Infrastructure (AMI) or Distribution Automation (DA) mesh networks and cellular providers. Today Sentient Energy's overhead devices are deployed in the field in the tens of thousands, operating on Silver Spring Networks (SSN) and Landis+Gyr (L+G) mesh, as well as cellular networks. The UM3's local processing and advanced analytics capabilities reduce the burden on the communications network by transmitting only key event information, in real time and by exception, while forwarding detailed data only upon request or when bandwidth is available.

## **Fault Detection and Location.**

Sentient's UM3™ Fault 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.**

Sentient Energy's UM3 Log-I app continually measures current values and derives 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. The Sentient Energy Log-I app gives the operator visibility into the network loading conditions, and enables maximizing asset utilization by basing asset replacement and network operational decisions on accurate, real data rather than best-guess simulations or state estimations.

## **Fault and Disturbance Oscillography.**

Equipped with high resolution waveform capability at a rate of 256 samples per cycle, Sentient's UM3 captures and records fault and disturbance waveforms that occur on underground cables and equipment. Waveforms are used by Sentient's Grid Analytics Applications and Disturbance Management applications to identify probable fault causes or identify failures before they cause future outages. Complete current and waveform data is stored locally on the UM3 and is available to download when needed. Sentient Energy's Grid Analytics System provides analyses, reports and visualization tools to enable utilities to shift from reactive mitigation in restoring outages and repairing equipment to proactively identifying pre-fault anomalies such as partial discharge and excessive arcing to prevent future outages.

# Sentient UM3™

## A Complete Grid Analytics System.

Sentient Energy's Grid Analytics System consists of the MM3, ZM1, UM3 line sensors and the Ample Analytics suite. Sentient's flagship, the MM3™, is an intelligent sensor with high-performance sensors featuring substation-class measurement, computing and processing capabilities. Sentient's ZM1 complements the MM3 to provide locally capture and process detailed data at many points along the network and communicate specific alerts and analyses to SCADA or Ample™ Analytics modules for feeder or system wide studies. This decentralized approach maximizes the amount of information gathered in the field while minimizing the amount of data transmitted.

## Ample™ Analytics Suite.

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

## 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; it is extensible to voltage monitoring, water level, as well as NOX and CH4 detection in the underground vault. The UM3 uses GPS for location and the synchronization and precise time stamping of all measurements.

The UM3 also features patent-pending communications software that efficiently enables uploads and downloads over constrained networks allowing data transfers, software upgrades and configuration changes remotely over the air from the utility's control center.

Wireless communications (WAN)	Cellular (LTE/4G,3G), L+G Gridstream, Silver Spring Networks
Current, Fault Measurement	0 to 800A RMS, up to 10kA peak current; 25kA RMS fault current tolerant
Waveform Capture (I & V)	256 samples/cycle (15.3 KHz), continuous 24 x 7, 1st-11th harmonics
GPS	Latitude/Longitude and precision time stamping
Conductor Temp Measurement	4 - 35kV, 0-800A
Operating environment	-40°F to + 185°F (-40°C to 85°C)
Conductor size	2.6" 1500MCM cable
Physical Size and Construction	10" x 8" x 6" Fully submersible; 10+ year lifespan
Phases	3 phases monitored per unit
Communications Module	5.5" x 5.5" x 4.0"; 1 for up to 4 UM3s
Qualifications	ANSI®/IEEE495-2007; FCC part 15, CE Mark, UL, IP-68 12ft/30day submersion, IP-69K wind driven spray, ASTM B-117 salt fog, ASTM G 154-06 UV exposure, ISTA 3A, MIL-STD-810F/504 oil and salt water immersion
Event Notifications / LED	Immediate network messaging and local super-bright LED FCI-type indicator
Availability / Normal	100% available, unlimited 2-way communications
Availability / Outage	Typical: 60 minutes (cellular) or 30 minutes (900 MHz mesh), sensor and communications at full power
Installation	ASTM D120 Class 2 glove installation



DETECT  PREDICT  DELIVER



Sentient Energy makes power delivery safe, reliable and solar ready.

We provide the industry's only Grid Analytics System that covers the entire distribution network with quickly deployed intelligent sensors and analytics that detect and analyze potential faults and grid events. We lead the market with the largest mesh network line sensor deployments in North America, and partnerships with leading utility network providers including Silver Spring Networks, Landis + Gyr, Cisco, and AT&T. For more information, visit [www.sentient-energy.com](http://www.sentient-energy.com).