



# MM3ai System

Sentient Energy's MM3ai System combines line sensors, software, and analytics technologies to provide utilities with predictive indicators of impending outages. The MM3ai System generates a daily report of feeder anomaly activity with alerts for likely future outages.

## Benefits:

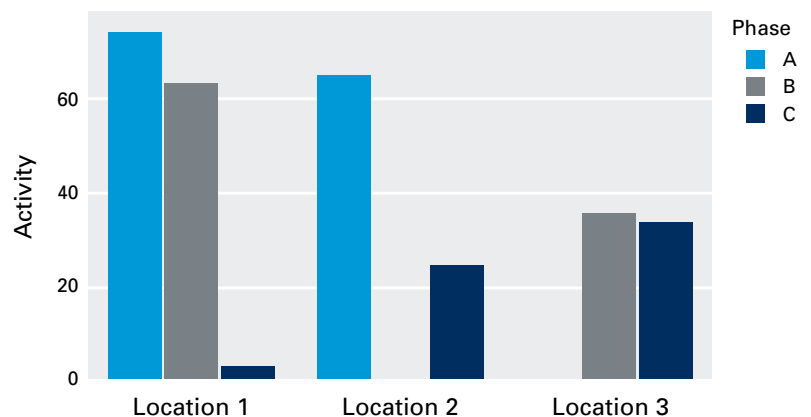
- More complete visibility of feeder system activity by location
- Greater reliability through base diagnostic predictive analytic indicators
- Ability to validate predictions with field outage results
- Lower required investment

## Advance Outage Event Detection Report

The MM3ai System produces a daily report that helps utilities go beyond reactive response and proactively address problem areas on their overhead feeders. A status of each feeder location (Good Standing, Watch, Warning, Alert) is provided along with identification of top locations to address. In addition to anomaly activity the Advance Outage Event Detection Report also includes data on sustained and momentary interruptions for the feeder locations.

To create the report the system combines high-fidelity waveform data from MM3ai sensors with proprietary algorithms to zero in on precursor anomalies indicative of vegetation in contact with lines and impending equipment failures. Analytic models for vegetation and equipment failures have been developed and refined based on more than a decade of distribution system waveform analysis, edge computing, machine learning, and field proven reporting.

Top Sites for Precursor Anomalies



## Fault Detection and Load Monitoring

In addition to precursor anomaly reporting, the MM3ai System allows Operations teams to locate faults faster. More precise fault location data reduces crew patrol time and shortens outage durations.

Planning teams can also use load data to improve capacity planning, phase balancing, and asset management by identifying overloaded assets such as transformers and conductor segments.

## Complete Solution

The MM3ai System includes the following for a period of five years:

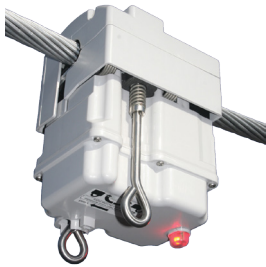
- Ninety-six MM3ai Line Sensors
- Ample Software with cloud deployment
- Cellular fees
- Deployment and ongoing support including report training & 1-hour monthly meetings
- Software updates
- Shipping
- Warranty



# MM3ai System Components

## MM3ai Line Sensor

Sentient Energy's MM3ai is an intelligent overhead sensor with substation-class measurement for fault detection, load monitoring, and anomaly data capture.



## Ample®

Sentient Energy's Ample Analytics Platform combines sensor fleet management with versatile data integration and high availability grid monitoring.



## MM3ai Line Sensor Specifications

Wireless Communications (WAN)	Cellular (Public/Private LTE): AT&T, Verizon, SoLinc, and additional international carriers Mesh – Itron Protocols: DNP3/IEC 60870-5-104 <sup>1</sup>
Current, Fault Measurement	0 to 800A RMS, up to 10kA peak current, fault type identification; 25kA RMS fault current tolerant
Waveform Capture (I & V)	130 samples/cycle (60 Hz) and 156 samples / cycle (50 Hz)
Sensing/Characteristics	Up to 44kV (L-L). Measures E-field and current presence, current direction, waveform
GPS	Lat/Long & precision time stamping, +/- 64 micro seconds
Operating Environment	-40°F to +185°F (-40C to +85C)
Off Peak Low Current Ride-Through (for 8 hrs @ 22°C)	50 Hz – 8A, 60 Hz – 7A
Current for Full Sensor and Communications Operations	50 Hz – 10A, 60 Hz – 10A
Conductor Size & Surface Area	0.375" to 1.030" (9.5 to 26.2 mm) (up to 795 AAC); 0.25" with armor rod; 71.3-538mm <sup>2</sup>
Physical Size & Construction	8" x 4.5" x 5.5"; Weight: 6.5 lbs; Weather-proof; 10+ year lifespan
Qualifications	ANSI®/IEEE495-2007; FCC/IC/PTCRB/Carrier certified; salt fog environmental
Event Notifications / LED	Immediate network messaging and local super- bright LED FCI-type indicator
Availability / Outage	60 min. cellular or 30 min. Itron sensor & communications at full operation
Installation	Standard hot stick; minimal installation time with no pole attachments required
Security	Transport Layer Security (TLS)
Clamping Mechanism	Metallic and mastic grippers available

## Ample® Specifications

User Interface	Microsoft Edge, Google Chrome
Security Implementation	TLS, HTTPs, Federated Identity with SAML 2.0
Licensing	5 year license for MM3ai System
Software Deployment Options	Managed cloud for MM3ai System
Client	Microsoft Edge, Google Chrome
Scalability	50,000+ endpoints
Communications Support	Cellular (LTE/4G), Itron Mesh
Communications Security	Transport Layer Security (TLS) with managed PKI, DNP3 SAV5
Protocols	DNP3, IPv4, IPv6

<sup>1</sup>DNP/IEC 60870-5-104 through concentrator

## 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](http://www.sentientenergy.com).

© Sentient Energy, Inc., 15815 Executive Drive, Suite 300, Frisco, TX | [info@sentient-energy.com](mailto:info@sentient-energy.com)