



# MM3ai System

Sentient Energy's MM3ai System combines advanced analytics technologies, intelligent line sensors, and software to provide utilities with new capabilities to tackle complex grid challenges. The MM3ai System generates daily reports that show predicted outages and weekly reports that identify feeders with elevated levels of harmonics.

## Benefits:

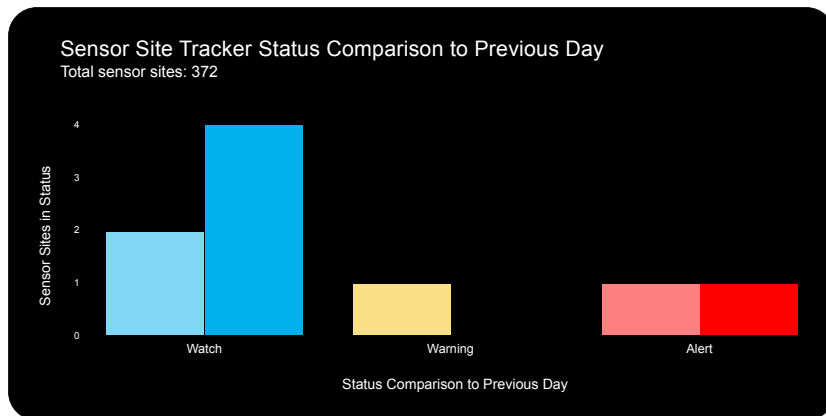
- More complete visibility of system activity by location, 24 x 7
- Outage predictions for equipment failures and vegetation contact
- Harmonics measurements to identify feeders with elevated levels
- Improved fault detection and location and load monitoring
- Simplified deployment makes the solution more cost effective

## Complete Solution

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

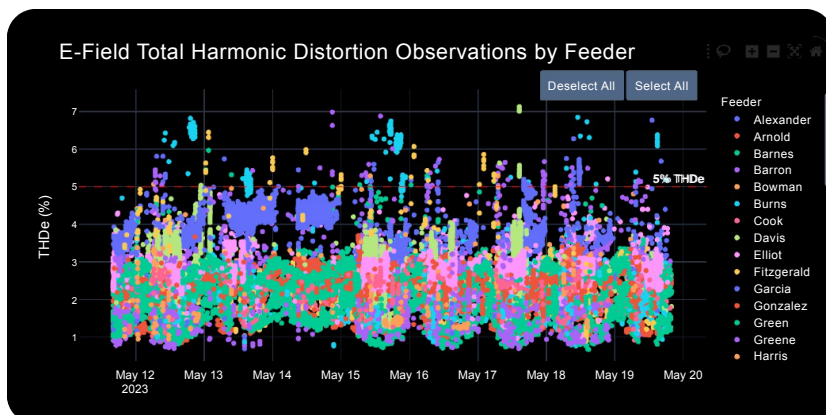
- ✓ Ninety-six MM3ai Line Sensors
- ✓ Ample Software with cloud deployment
- ✓ Deployment and ongoing support including report training and 1-hour monthly meetings
- ✓ Cellular fees
- ✓ Software updates
- ✓ Shipping
- ✓ Warranty

## Advance Outage Event Detection Report



The MM3ai System produces a daily report that helps utilities identify feeder segments with high levels of precursor anomalies known to precede outages due to equipment failures and vegetation contact. Status of each feeder location (Watch, Warning, Alert) is provided along with identification of top locations needing attention. With this information utilities can take quick action to preempt outages and improve reliability metrics.

## Harmonics Insights Report



The MM3ai System produces a weekly report that helps utilities identify feeders with elevated levels of harmonic distortion. The report includes a geospatial view of sensor sites using a redlight approach for areas of concern. By pinpointing these problem areas, utilities can initiate actions to determine root cause and mitigate the adverse effects of harmonics including power quality issues and potential equipment damage.



# 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 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 and precision time stamping, +/- 64 micro seconds
Operating Environment	-40°F to +185°F (-40C to +85C)
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 to 538 mm <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
Off-Peak Low Current Ride-Through Holdover	For sensing and cellular communications at full operation @22C – At 0A, 24 hours – At 8A, 100 hours
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)
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

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](#).