



ENGO® and GEMS® Grid Edge Voltage Control

Controlling voltage is an essential strategy for energy savings through Volt-VAR optimization (VVO), conservation voltage reduction (CVR), and peak demand reduction. Voltage optimization at the grid edge also reduces voltage volatility, allowing for a higher level of PV solar integration on distribution systems. The Sentient Energy Edge of Network Grid Optimization (ENGO®-V10) device and Grid Edge Management System (GEMS®) work together to create the grid edge voltage control solution. ENGO is a Dynamic VAR Controller and GEMS is the software for monitoring, configuration, and peak demand management.

Benefits:

- Energy savings
- Peak demand reduction
- Increased DER hosting (solar and EV)
- Power quality improvements
- Extended voltage visibility

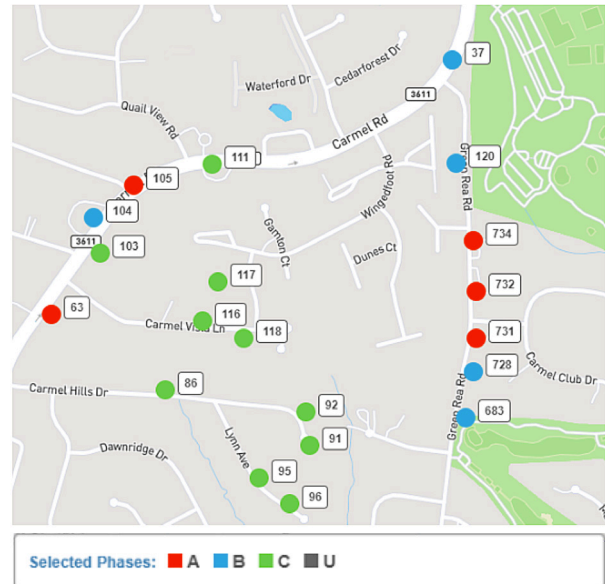
Voltage Regulation at the Edge of the Grid

The ENGO-V10 is connected on the secondary-side of the transformer at 208, 240 or 277 Volts. It monitors line voltage and actively optimizes the voltage level by injecting reactive power when the observed line voltage drops below a configurable setpoint. Each ENGO-V10 is capable of injecting 1 kVAR increments on a sub-cycle basis up to 10 kVAR. ENGO units are designed to operate autonomously in concert with other ENGO units deployed along a feeder at the edge of the distribution grid. VARs injected on the secondary side help support the primary side with a unique "self-balancing" capability. ENGO is very efficient with losses under 0.35% at 10 kVAR.

Remote Configuration and Monitoring

The ENGO-V10 communicates via either cellular or mesh networks to a head-end system. GEMS provides real-time visibility of all ENGO-V10 activity, enables remote setpoint changes and firmware upgrades. Setpoint can be changed on demand or scheduled by time of day, load type, or season. GEMS allows grid operators to see voltage profiles on a per cycle or minute basis, and VAR contribution of the ENGO devices. With either hosted or on-premise architecture options, GEMS complies with utility cybersecurity and IT standards, providing a DNP3 interface to forward ENGO voltage measurements to SCADA or ADMS systems.

GEMS Map View



Ease of Deployment

The ENGO-V10 is installed on a pole right below an overhead distribution transformer. The ENGO-V10 weighs only 48 lbs. and is easily deployed on the secondary-side with no need to power down customers during installation. The ENGO-V10 is rugged with a broad operating temperature range, immunity from overvoltage and surge, for a 15-year life.

Voltage Conservation

Once the ENGO-V10 and GEMS solution reduces voltage fluctuations and increases voltage margin, utilities can lower voltage at the substation while improving power quality to customers. In field deployments, ENGO-V10 and GEMS have enabled utilities to achieve incremental energy savings of 1-3%.

Peak Demand Reduction

Peak demand reduction is attained by applying ENGO and GEMS together with a conservation voltage reduction (CVR) in order to operate at the low end of the acceptable voltage supply. With voltages stabilized and optimized by ENGO devices, utilities can optimally reduce the voltage at substations and reduce peak demand without under-voltage violations.

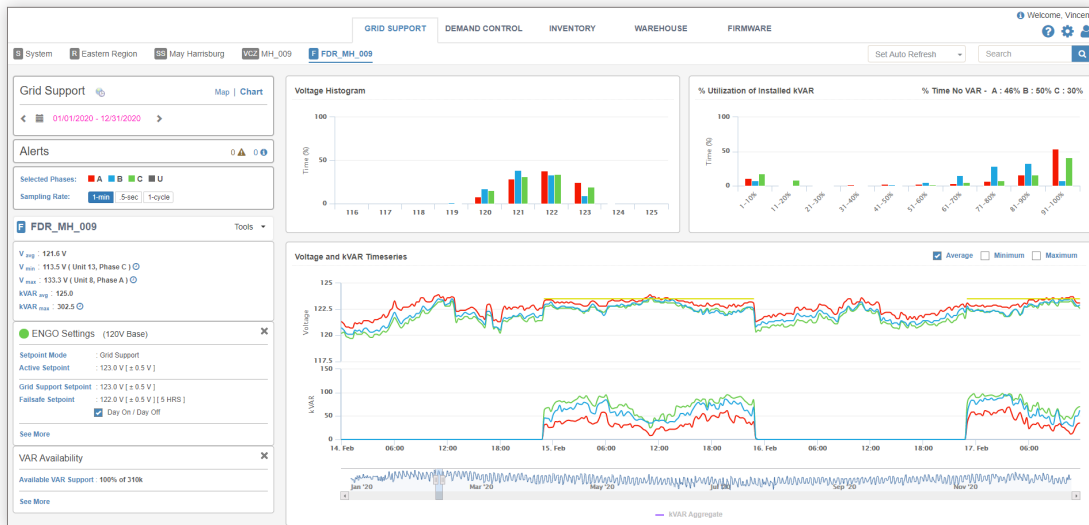
DER Hosting (Solar and EV)

Intermittent power from solar generation increases voltage instabilities which degrade power quality and increase wear on primary VVO and CVR equipment, causing utilities to limit solar penetration on their distribution systems. ENGO and GEMS compress voltage fluctuations caused by distributed PV solar and boost low voltage points due to EV charging or industrial loads.



ENGO[®] and GEMS[®] Grid Edge Voltage Control

GEMS Grid Support View displays feeder voltage levels and kVARs injected.



ENGO-V10

Key Characteristics

Attribute	ENGO-V10 Specs
Nominal Voltage	208V/240V/277 V Single phase
Measured Voltage Accuracy	0.5%
Injected VARs	0-10 kVAR leading
Losses	< 0.35% @ 10 kVAR
Nominal Frequency	60 Hz or 50 Hz
Dimensions (inches)	29.3" x 17.9" x 6.6"
Weight with 20 ft of Cabling	48 lbs / 22kg
Installation	Pole mount
Networking	Cellular LTE, Mesh
Overvoltage Protection	330V for up to 1 minute
Fusing	100A internal fuse
Surge/Impulse Protection	IEEE/ANSI C62.41 C3 IEEE C62.41 B3

Attribute	GEMS Specs
Architecture	Web-based, hosted or on premises
Over the Air Programming	Set points and firmware updates
Setpoint Configurability	By time, day type, season

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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