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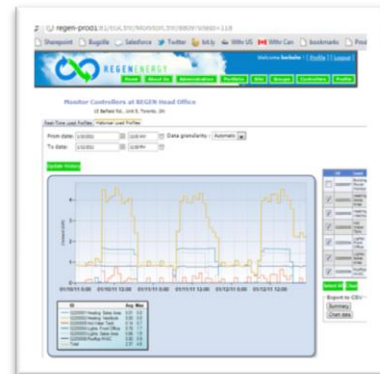
Managing Electric Vehicle Charging using Swarm Logic



EnviroGrid provides an ideal load management solution for electric vehicle charging. It remains the only load management solution to utilize swarm logic, a distributed intelligence technique to allow multiple loads to communicate and cooperate with each other in a decentralized manner. Swarm logic allows for automated load management decisions to be made by each node as opposed to top-down command and control logic, i.e. each node communicates with every other node and makes its own autonomous decision every few minutes in order to optimize the system's peak demand. EnviroGrid controllers are the only devices available today to implement REGEN Energy's patented load management techniques.

Swarm Logic provides ideal benefits for Electric Vehicle Load Management:

- Greatly simplified installation compared to command & control methods that require a central server, statically configured to the group of loads: swarm logic allows for a dynamically changing number of loads to automatically cooperate without prior knowledge of each other
- Flexible operation compared to command & control methods that require static configuration of load control: swarm logic allows for a set of loads with dynamically changing power requirements to automatically cooperate with each other
- Dynamic rebalances compared to static command & control methods: swarms are highly responsive and automatically rebalance when load duty cycles are varied (i.e. to implement different load management strategies due to immediate grid supply constraints or pricing events). This allows the evaluation of a wide span of load balancing behaviors, tailored to meet different customer & utility objectives.
- Dynamically rebalances even using loads that may switch their behavior from consuming to generating power. This is particularly significant for V2G applications, given how dynamically EVs that feed power may appear – or detach – from the grid. Using swarm logic, the collective automatically rebalances its cumulative load even if some loads generate and therefore already contribute to lowering system peak.



EnviroGrid™ EV Charging Jumpstart Kit

Our EV Charging Jumpstart Kit includes the following:

- 5 x EnviroGrid Controllers: Monitor and control an EV charging station
- 1 x EnviroGrid Communications Gateway: Flow data to/from controllers to the EnviroGrid Portal
- Up to 5 user accounts with 1 year access to the EnviroGrid Portal: Access to an Internet-based portal, providing analytics and the ability to modify controller settings remotely
- EnviroGrid EV Scenario User Guide: Documentation describing how to manage different EV charging scenarios per your desired load management strategies
- 1 year Gatewaywireless services
- 1 year equipment warranty from date of installation

Additionally available items/services:

- On-site installation and EV charger integration assistance
- Custom gear required to integrate controllers per vendor-specific EV charging station requirements

EnviroGrid™ Product Specifications

ENVIROGRID RM2-0001 CONTROLLER

Device

- External LCD & keypad, enclosed electronics
- Weatherproof, flame retardant enclosure
- Dimensions (in mm/inches – See figure):
A: 10.85/4.27, B: 15.89/6.25, C: 2.98/1.17

Installation

- Screw-mount using screw tabs
- Pre-kitted with 5'ft of 12 conductor cabling
- 2 Clamp-on current sensors (can attach up to 3)

Communications

- 2.4 GHz band (2405MHz – 2480MHz) channel selectable
- Microchip MRF24J40 ZigBee Transceiver
- RM2-0002 Communications Gateway provides IP connectivity to EnviroGrid Portal
- Up to 875yards (800meters) communication distance between controllers
- Configurable repeater functionality to extend range of network
- Available magnetic mount extension for antenna

Control

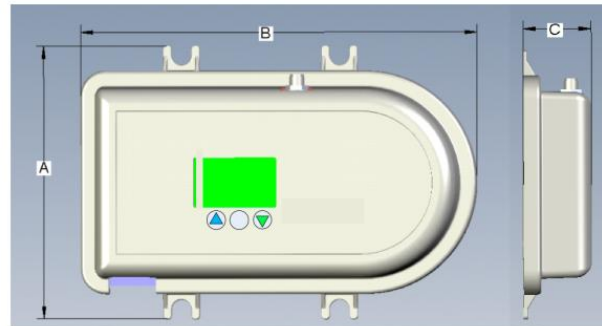
- Microchip PIC18LF8723 microcontroller
- Load shedding via 2 internal dry-contact relays
- Relays can handle up to 30VAC, or be used to drive high-voltage contactors
- 0-100% duty cycle settings

Sensors

- Up to 3-phase 600VAC monitoring, up to 65 Amps per phase monitoring (or custom-designed for very high current applications)
- Samples watts and calculates power using configured phase voltage setting

Certification

- UL-C and UL-US Indoor/Outdoor Certification, FCC and IC Wireless Certification



ENVIROGRID MONITORING & CONTROL PORTAL

Usage

- Permits browser-based access to controller activity, settings, and history for authorized sites
- Secure access via pre-authorized accounts, allows for view-only or site manager privileges

Monitoring

- Receives detailed load information every 5 minutes (configurable) from controllers
- Time-stamped load information includes each controller's current sensor reading, duty cycle, maximum load recorded, relay enablement state.
- Parses wireless messages from all controllers, storing values in server
- Allows near real-time view of controller load profiles and historical load profiles

Control

- Allows for user-configurable duty cycle settings per controller, gathered as a site profile
- Allows for recurring schedules of profiles as well as scheduled and manual overrides

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