

Armada Power Optimizer



DELIVERING BENEFITS TO THE GRID & CONSUMERS.

An Armada Power Optimizer is a small, but powerful device. When installed on an electric water heater and connected to our secure, enterprise software platform, this controller effectively transforms an electric resistive water heater into a rapid-response, energy storage asset without affecting end-user comfort.

Designed to solve some of the power grid's most pressing concerns, the Optimizer unlocks a myriad of benefits. Five times more cost-effective than batteries for most grid applications, it supports a variety of grid applications including demand response, thermal energy storage, energy arbitrage, renewables integration, time-of-use optimization, fast frequency regulation, cold load pickup support, droop control, and more.

The unobtrusive Armada Power Optimizer easily attaches to an electric water tank with no required plumbing modifications. Two small, wire probes are positioned to continuously monitor the top and bottom tank temperatures, ensuring hot water remains available. The sensors efficiently track power and voltage in real time and the resulting telemetry helps identify leaks, burned out elements, and other tank anomalies.



OPTIMIZER MODEL OPTIONS

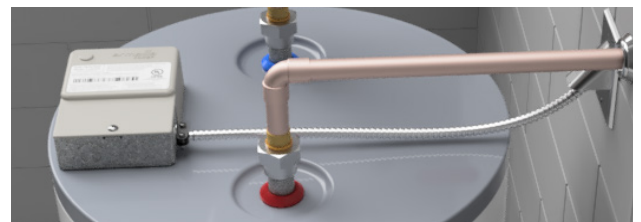
LCS2400 WI-FI ONLY LCS2400CW WI-FI + CELLULAR

❖ LCS2400 Family - Standard Features

- Easy Retrofit Installation
 - » 30 minute typical installation with no plumbing modifications
 - » Tank mount, or wall/remote mount options
- Cycle life: 4M+ switches
- Security
 - » SSL/TLS encryption
 - » Elliptic curve crypto-authentication and secure hardware-based key storage
 - » Onboard hardware security chip w/certificate based unique authentication
- Supports 120/240/208V devices at 23 Amp max resistive loads
- Included: 2 surface mount temperature probes +/- 1 C accuracy
- Meeting accuracy: 0.2%
- < 12-cycle response rate with 0.3Hz deviation
- Preheating before curtailment events and automatic temperature prioritization after events to minimize the probability of customer impact.
- Continuous operation does not impact the life of the tank or heating elements and can extend the life of the thermostats.
- Can identify a failed heating element before the tank is cold.

❖ Wi-Fi + Cellular Features

- Cat M1 certification
- Compatible with the Verizon Wireless LTE network
- 50MB bandwidth usage per month based on annualized data of thousands of devices
- Consistent usage in grid-support applications such as fast-frequency regulation and renewables firming. Data rate is slightly less if the device is limited to supporting less intensive actions including demand response or time-of-use programs.



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SPECIFICATIONS

❖ LCS2400 (Wi-Fi only)

- 802.11 b/g/n Wi-Fi connectivity
- Dimensions: 6.46”L x 4.88”W x 2.17”D
- Two thermistor channels for real-time top and bottom temperature measurement and optional leak sensor
- UL916 Listed, File E475847
- 17 Patents on hardware and software

❖ LCS2400CW (Wi-Fi + Cellular)

Shares same specs as LCS2400 (above), plus:

- 2-year limited warranty
- Certified CAT M1 on Verizon Network (aka LTE Cat-M)
- Channel bandwidth: 1.4MHz
- Bandwidth per Device: 50MB
- Download peak rate: 350 kbps
- Upload peak rate: 350 kbps
- Device transmit power: 20 / 23 dBm
- Latency: 10 - 15ms
- Duplex mode: Full duplex or half duplex

