

# WIRELESS BATTERY MONITOR



CellSPY Wireless Battery Monitors are designed to measure and continuously report the following parameters:

- DC voltage across the battery terminals
- AC ripple voltage across the battery terminals
- Battery's ohmic value
- Temperature at negative battery post





There are three sensor types for different measurement ranges:

- CSPY-400-0 (batteries with nominal voltage 2 - 12 V)
- CSPY-400-1 (batteries with nominal voltage 12 V - 16 V)
- CSPY-400-2 (batteries with nominal voltage 1.2 V)

CellSPY measures the battery's ohmic value of both metallic and chemical paths. Unlike other monitors on the market, which consume 10s and 100s of Amps during internal ohmic value measurements, CellSPY "gets the job done" using 1 A of load current for a fraction of a second.

Thanks to its advanced DSP-based noise filtering, ultra-fast 24 bit ADC's and negligible current dissipation, CellSPY is the smallest and most technologically advanced Battery Monitor on the market today.

## OPERATING SPECIFICATIONS

DC Voltage Measurement:	Range 1.2 V - 16 V Resolution 1 mV Accuracy 0.5 %
Temperature Measurement:	Range 0 °C - 80 °C Resolution 0.01 °C Accuracy +/- 1 °C
Impedance Measurement:	Range 0 - 65 mΩ Resolution 1 μΩ Accuracy Better than 3 %
AC (Ripple) Voltage Measurement:	Range 0 - 200 mV RMS Resolution 1 mV Accuracy 1 % Max Freq 400 Hz (no attenuation)
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50 m (expandable with repeaters)
Approvals:	   

Power supply:	Range 1.2 VDC - 16 VDC / 1.2 A (voltage depending on sensor type)
Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing
Dimensions & Weight:	2.9" x 1.2" x 0.5" (74 mm x 32 mm x 13 mm) 2.2 oz (60 g)
Enclosure:	Material: PC Degree of protection: IP40 IK code: IK08

### KEY ATTRIBUTE

CellSPY can measure a battery's ohmic value in a very noisy environment with negligible power dissipation, making itself, almost "invisible" to the monitored battery.

# WIRELESS CURRENT TRANSDUCER



EMSYS's Unique Dual-Core Wireless Current Transducer (WCT-400-10-1000-30) provides accurate Load AND Charge DC current monitoring.

Thanks to its Dual-Core Technology, the Wireless Current Transducer measures DC current of 1 A or 800 A with the same high accuracy. It uses field proven Hall Effect based circuitry to provide a superior solution for DC applications, with minimal risk of permanent magnetization.

Its wide power supply range (12 - 60 VDC) allows it to be powered from almost any DC power source. Plug and Play installation, Non-Invasive Design and Wide Power Supply range are just a few of its key features.

## OPERATING SPECIFICATIONS

**DC Current Measurement:** Range: 0 - 800 A  
Resolution: 0.1 A  
Accuracy (up to 10 A): 1 % or better  
Accuracy (up to 800 A): 1 % or better  
Linearity ( full range): 1 % or better

**Power Supply:** Range: 12 - 60 VDC  
Power Disipation < 200 mW

**Wireless Communication:** Frequency ISM Band - 2.4 GHz DSSS  
Range indoor > 50 m  
(expandable with repeaters)

**Approvals:** 

**Maximum Load Cable Diameter:** 30 mm

**Operating Temp.:** 0 °C to 60 °C (32 °F to 140 °F)

**Storage Temp:** 0 °C to 60 °C (32 °F to 140 °F)

**Humidity:** 5 - 85 %, non-condensing

**Dimensions & Weight:** 2.9" x 1" x3.1" (74 mm x 26 mm x 80 mm)  
10.2 oz (290 g)

**Enclosure:** Material: PC  
Degree of protection: IP40  
IK code: IK08

### KEY ATTRIBUTE

A key attribute of the EMSYS Wireless Current Transducer is high accuracy and linearity of measurements across measurement range.

# WIRELESS AMBIENT MONITOR



The Wireless Ambient Monitor (WAM-400) measures ambient temperature which is useful in detecting faulty air conditioning or improper ventilation.

Additionally Ambient monitors can be used in conjunction with our CellSPY battery monitors to detect a thermal runaway in its early stages.

Our web-based application will compare the ambient monitor's measurements with the battery temperatures collected by CellSPY monitors. If the "delta" between those two measurements exceeds a preset threshold, the user will be alerted immediately with an email or SMS.

Wireless Ambient Monitor is powered directly from the batteries with voltage range from 10 to 16V.

They are not limited to temperature measurement, they also measure ambient humidity and there is an option to measure pressure as well.

## OPERATING SPECIFICATIONS

Ambient Temperature Measurement:	Range: 0 - 60 °C (32 - 140 °F) Resolution: 0.01 °C Accuracy: +/- 1 °C
Ambient Humidity Measurement:	Range: 5 - 85 % Resolution: 1 % Accuracy: +/- 5 %
Ambient Pressure Measurement:	Range: 300 - 1200 hPa Resolution: 0.5 hPa Accuracy: +/- 0.5 hPa
Power Supply:	WAM-400: 10 - 16 VDC Power Disipation < 200 mW WAM-400-B-x: Powered from the internal battery
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50 m (expandable with repeaters)

Approvals:



Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing
Dimensions	3.4" x 1" x 0.4" (86 mm x 26 mm x 11 mm)
& Weight:	1.6 oz (45 g)
Enclosure:	Material: PC Degree of protection: IP40 IK code: IK08

### KEY ATTRIBUTE

The difference between ambient and cell temperature, as recorded by Wireless Ambient Monitors and CellSPYs, respectively, is an excellent parameter for an early thermal runaway detection.

# WIRELESS DC BUS MONITOR



The Wireless DC Bus monitor (WDCM-400) measures both DC voltage and AC ripple voltage across the entire battery bank.

DC voltage and the AC ripple voltage measurements give us an early warning if the battery charger begins to operate out of spec.

Overcharging or undercharging batteries reduces their overall life and puts the battery backup system in danger.

Excessive AC ripple voltage will reduce battery life and “inject” unwanted noise into the system, often leading to equipment failure.

Wireless DC Bus monitors measure very high frequency AC ripple voltage ensuring nothing goes unnoticed.

This sensor is powered from the most negative battery in the string and it also measures Ambient Temperature.

## OPERATING SPECIFICATIONS

DC Voltage Measurement:	Range: 15 - 600 VDC Resolution: 0.01 VDC Accuracy: 1% or better
AC (TrueRMS) Voltage Measurement:	Range: 0 - 10 V RMS Resolution: 1 mV Accuracy: 1% or better
Ambient Temperature Measurement:	Temp. sensor: Thermistor Resolution: 0.01 °C Accuracy: +/- 1 % Range: 0 - 60 °C (32 - 140 °F)
Power Supply:	Range: 5-16 VDC / 20 mA
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50 m (expandable with repeaters)

Approvals:



Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing
Dimensions & Weight:	3.4" x 1" x 0.4" (86 mm x 26 mm x 11 mm) 1.6 oz (45 g)
Enclosure:	Material: PC Degree of protection: IP40 IK code: IK08

### KEY ATTRIBUTE

Passive charge balancing is a unique feature available with Wireless DC Bus Monitors in conjunction with the CellSPYs. All batteries of the UPS can have equal charge regardless of the fluctuations of the charger output which is imperative for maintaining their health and keeping the UPS reliable.

# WIRELESS RELAY




The Wireless Relay (WRL-400) provides a way to remotely disconnect the power supply to a UPS. It is a key element of the Thermal Runaway prevention system.

In the event of a thermal runaway the relay is able to automatically disconnect the power supply from the UPS. Opening and closing functions can also be controlled manually in the EMSYS WebConfig application. The Relay is powered from any 12 - 60 VDC power source.

## OPERATING SPECIFICATIONS

Relay Output:	Normally Opened Normally Closed
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50m (expandable with repeaters)
Power Supply:	12 - 60 VDC Power Disipation < 200 mW
Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing

Dimensions & Weight:	5.4" x 1" x 0.6" (138 mm x 26 mm x 14 mm) 1.2 oz (35 g)
Enclosure:	Material: PC Degree of protection: IP40 IK code: IK08
Approvals:	

### KEY ATTRIBUTE

EMSYS Wireless Relay can disconnect the power supply and eliminate one of the the key preconditions for Thermal Runaway.

# MINI GATEWAY






EMSYS Mini Gateway (SRV-1100) is primarily designed to serve smaller and remote sites as a Wireless to IP and IP to Wireless bridge. It is also an application server which means that it allows direct access to the collected data through a variety of interfaces.

ModbusTCP, ModbusRTU and SNMP are a few examples of industry standard protocols supported by EMSYS Mini Gateway.

## OPERATING SPECIFICATIONS

Processor:	AM335x 1GHz ARM Cortex-A8
Memory:	RAM: 512 MB DDR3 Onboard Flash: 4GB 8-bit eMMC MicroSD card 3.3 V Supported
I/O ports:	USB Standard A host port (direct) USB mini B device port (direct) Micro HDMI LAN
Power Supply:	2.1 mm x 5.5 mm 5 V jack POE ( IEEE Alternative B ) via injector and splitter Mini USB
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50m (expandable with repeaters)

Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing
Dimensions & Weight:	1.1" x 2.4" x 3.9" (28 mm x 62 mm x 100 mm) 3.5 oz (100 g)
Regulatory Compliance:	  

### KEY ATTRIBUTE

EMSYS Mini Gateway can be used as a bridge between a remote site and a central server and as a standalone application server for a smaller site with most of the functionality of the regular Gateway.

## GATEWAY



The EMSYS Gateway (SRV-2000), a standalone, ruggedized application server, is used to collect data from the EMSYS wireless network enabling users to easily access collected data through a variety of interfaces.

ModbusTCP, ModbusRTU, SNMP are a few examples of industry standard protocols supported by EMSYS Gateway.

EMSYS Gateway acts as a standalone web server allowing users to access and review the latest and historical data using any web browser.

## OPERATING SPECIFICATIONS

Processor:	Intel ATOM N270 1.6 GHz
FSB:	533 MHz
Chipset:	North Bridge: Intel 945GSE chipset South Bridge: Intel ICH7M chipset
Memory:	Single channel DDR2 533/667 MHz SO-DIMM, up to 2 GB
LAN:	Gigabit Fast Ethernet by Intel 82574 GbE controller
Hard Drive:	128 GB Solid State Hard Drive
Power Supply:	Input: 100 - 240 V~, 50 - 60 Hz Output: 20 V, 2.0 A
Left Panel I/O:	1 wireless LAN antenna (optional) 1 power button 1 RS-232/422/485 serial port 1 DC power jack 3 USB ports
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50m (expandable with repeaters)

Right Panel I/O:	2 Gigabit LAN jacks (optional) 1 headphone/speaker jack (green) 1 microphone jack (pink) 1 USB port 1 DVI-I port 1 802.15.4 antenna connector
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Environmental Specifications:	Operating Temp: -10 °C to 60 °C Storage Temp: -20 °C to 80 °C Humidity: 5 % ~ 90 % (non - condensing)
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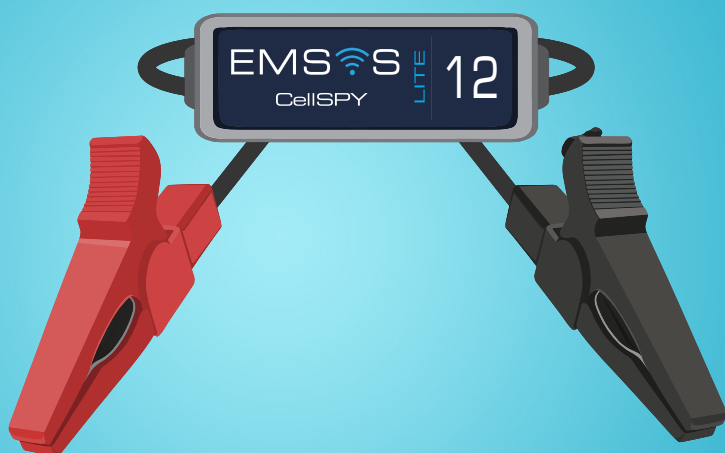
Regulatory Compliance:



Dimensions & Weight:	10.2" x 7.1" x 0.7" (260 mm x 180 mm x 19 mm) 2.4 lb (1.08 kg)
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# WIRELESS BATTERY MONITOR LITE






CellSPY Lite Wireless Battery Monitors (CSPY-400-L) are designed to measure and continuously report DC voltage across battery terminals and temperature at the negative battery posts.

Installation is very simple and does not require a special connector. The sensor is simply clamped on the battery post and begins working.

It is designed primarily for battery commissioning purposes. Measurements are sent to a cloud server via the onsite smartphone.

Different color lighting of the sensor indicates different measurement levels.

## OPERATING SPECIFICATIONS

DC Voltage Measurement:	Range 0.6 V - 28 V Resolution 1 mV Accuracy 0.5 %
Temperature Measurement:	Range 0 °C - 80 °C Resolution 0.01 °C Accuracy +/- 1 °C
Wireless Communication:	Frequency ISM Band - 2.4 GHz DSSS Range indoor > 50 m (expandable with repeaters)
Approvals:	  
Operating Temp.:	0 °C to 60 °C (32 °F to 140 °F)
Storage Temp:	0 °C to 60 °C (32 °F to 140 °F)
Humidity:	5 - 85 %, non-condensing

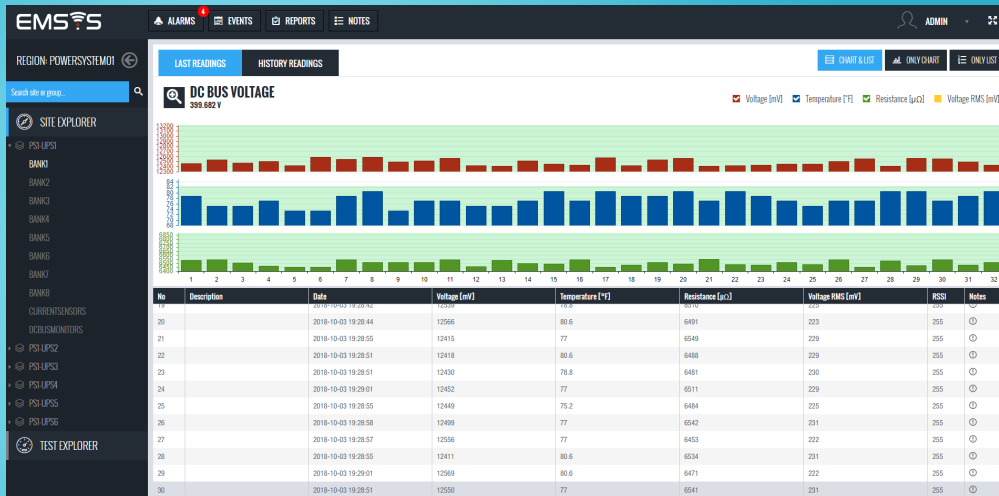
Power supply:	Range 0.6 VDC - 28 VDC (minimal start voltage 1.2 V) Power dissipation < 500 mW
Dimensions & Weight:	2.9" x 1" x 0.4" (74 mm x 26 mm x 11 mm) 2.2 oz (60 g)
Enclosure:	Material: PC Degree of protection: IP40 IK code: IK08

### KEY ATTRIBUTE

CellSPY Lite is easy to install, it has visual alarming and measures battery Voltage and Temperature in a very noisy environment with negligible power dissipation, making itself, almost "invisible" to the monitored battery.



# EMSYS CLIENT APPLICATION



EMSYS Client Application is the viewing window into the data aggregated by our central server via the various monitors utilized.

The intuitive graphical interface makes monitoring your assets easier than ever and gives the user complete and clear insight into the UPSs state of health in graphical and/or tabular form.

Compatible with any web browser, our monitoring application leverages the latest web technologies to sort your data with amazing speed, only available to desktop applications in the past.

## FEATURES

EMSYS intuitive web based application gives you full visibility of every battery within your system. Measurements are transmitted in real time and displayed numerically and graphically.

In order to provide comprehensive UPS information there are several views:

- Map View - shows the location of UPSs on a geographic map
- Latest Readings View - shows all latest readings for a chosen bank in a chosen site or UPS
- History Readings view - displays recorded readings for a selected period of time
- Alarm view - displays all current alarms (conditions/situations that require operator's attention)
- Events view - provides a historical line of every system and sensor event in tabular form

Load Testing can be recorded with EMSYS Client Application using Test Explorer and Test View. While the CellSPY system automatically increases data collection in the event of any discharge, starting a test in the application before discharges allows for more comprehensive data collection before and after the discharge. This data can then be used to create a report, specifically designed for load testing applications.

EMSYS Client Application provides a variety of reports. They can be created manually or automatically (at a chosen frequency).

- Historical report – provides sensor data for a selected period of time
- Maintenance report – shows the state of the UPS in a chosen moment in time
- Resistance report – displays all battery resistance readings
- Load Test report – shows readings from a Load Test
- AlarmEvent Report – displays alarms and/or events from a selected time period
- Periodical Reports – these reports are created automatically by the system and they can be Alarm, Regular or Maintenance

### KEY ATTRIBUTE

EMSYS Client Application can also be used in load testing applications. During the test the system increases the data collection rate in order to "catch" as much data as possible and after the test, present it in a comprehensive Report in PDF or CSV format.