



## BATTERY MONITORING SYSTEMS

# WIRELESS BATTERY MONITORING SYSTEM

The CELLGUARD™ Wireless Battery Monitoring System (BMS) provides an accurate and reliable indication of battery state-of-health through monitoring and analysis of battery voltage, temperature, and conductance.



**WIRELESS COMMUNICATION**



**24/7 MONITORING**



**CONDUCTANCE MONITORING**

## HIGHLIGHTS & TECHNOLOGY

Get 24/7 remote access to the battery performance information you need to proactively maintain your stationary power systems and avoid costly downtime.

Conductance-based monitoring technology provides the most accurate, efficient, and non-invasive method possible for monitoring a battery's state-of-health.

Installation cost and time are reduced with the system's wireless communication capabilities which enable all hardware to communicate free of cabling.

Features solid noise immunity suitable for applications including power utilities, data centers, telecommunications systems, and DC systems with filtered AC electrical ripple.

Comprised of a Base Coordinator Unit (BCU) and single-battery sensor modules.

Provides both visual and digital battery state-of-health.

Capable of monitoring up to 16 battery strings, 300 max sensors per string, and 600 max sensors per BCU (irrespective of how they are divided by strings).

Built-in, highly intuitive CONVERGE™ web interface enables rapid, confident installation, remote system monitoring, alarm threshold configuration, rock-solid reporting (including granular discharge data gathering), and critical over-the-air software updates.

BCU communicates to UNITE™ Battery Asset Management Software via TCP/IP and supports MODBUS TCP/IP to integrate with building infrastructure. UNITE™ allows you to seamlessly and remotely drill down through your network of battery plants, strings, and individual batteries.

BCU is powered by the battery string voltage converter via battery string power.

## APPLICATIONS



CRITICAL POWER



DATA CENTERS



TRANSMISSION/  
DISTRIBUTION



RAIL



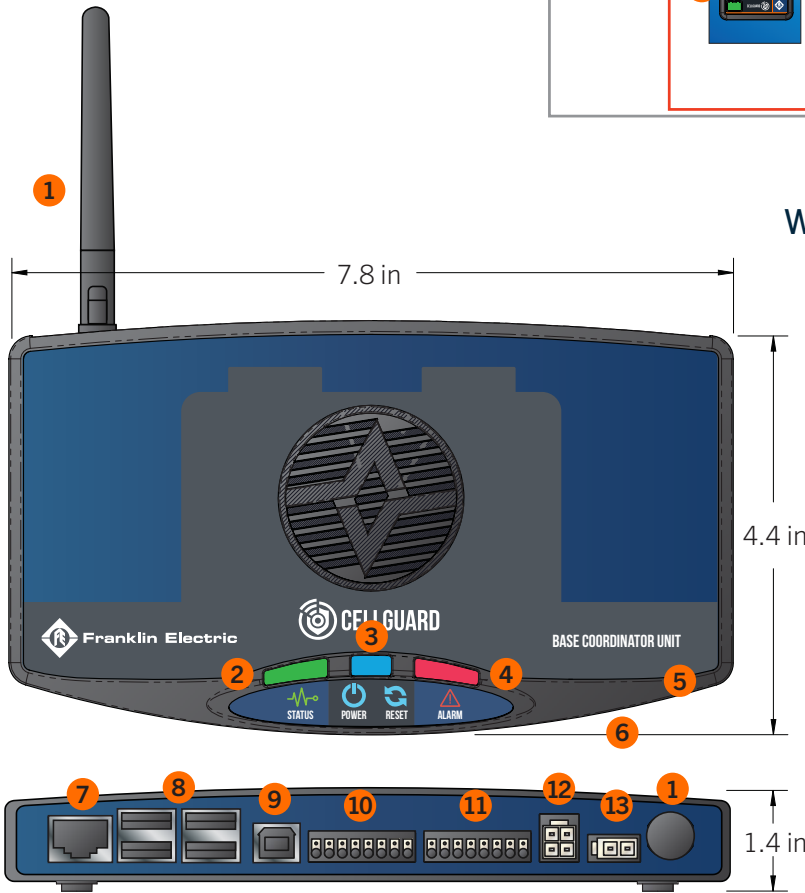
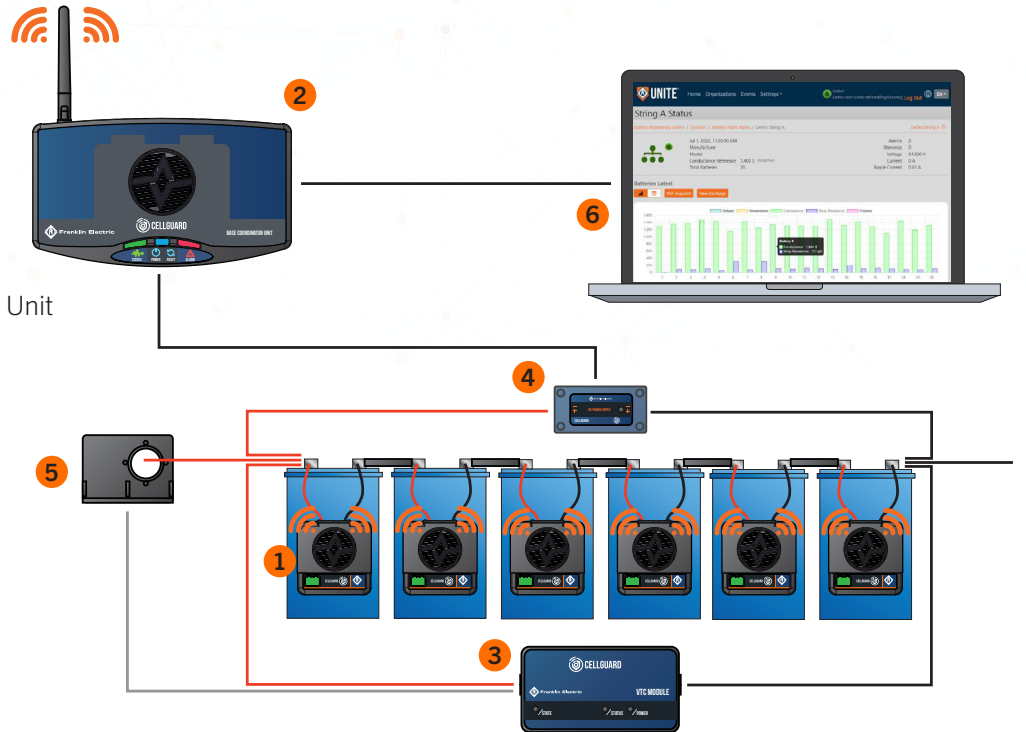
TELECOMMUNICATIONS

# SPECIFICATIONS

## SYSTEM COMPONENTS

### BASIC SETUP:

- 1 Wireless Sensor
- 2 Base Coordinator Unit (BCU)
- 3 Voltage, Temperature Current (VTC) Unit
- 4 DC-DC Converter
- 5 Current Transducer
- 6 UNITE™ Web Interface



BASE COORDINATOR UNIT (BCU)

## WIRELESS BATTERY SENSOR



- 1 Wireless Antenna
- 2 Status LED (Red, Green, Blue)
- 3 Power LED
- 4 Alarm LED (Red, Green)
- 5 CPU Activity LED (Red, Green)
- 6 SD Card Slot
- 7 Ethernet
- 8 USB (4)
- 9 UART
- 10 Alarm In (Analog & Binary)
- 11 Alarm Out (Major, Minor, Ground)
- 12 Temperature Input
- 13 Power (9 VDC)
- 14 Status LED (Green, Yellow, Red)
- 15 Battery Sensor Cable Connector

# SPECIFICATIONS

## BASE COORDINATOR UNIT (BCU)

Component	Specification
Battery Strings	1-16
Batteries per String	1-300
Battery Voltage Test Interval Range	1 – 24 hrs
Battery Conductance Test Interval Range	1 – 30 days
Power Input	9-12 VDC @ 800 mA
Operating Temperature	0° C - 65° C
Storage Temperature	-10° C - 80° C
Processor	Quad Core @ 1250 MHz
RAM	1 Gb SDRAM @ 400 Mhz
Storage	4 GB micro SD card
4 X USB Type A	2.0
UART	Baud Rate: 57.6 Kbps; Data Bits: 8; Parity Bit: None; Stop Bit: 1
Ethernet	RJ45; 10/100 Mbps; Auto-Negotiate; 802.3 Compliant
Analog Alarm Input	0.2-10 V differential
Binary Alarm Input	Dry Contact
Major/Minor Alarm Output	Form C Relay 110 VDC 125 VAC max
Wireless RF Radio Band	802.15.4 compliant; 2.4 GHz @ 8 mW (6.3 dBm)
Modbus	Ethernet TCP/IP UDP
Regulatory Compliance	FCC, CE, RoHS, IEEEE
Physical Dimensions	L:7.80 in, W:4.47 in, H:1.44 in

### Capabilities

- Supports up to 16 strings with 300 batteries per string
- Supports up to 600 sensors per BCU (irrespective of how they are divided by strings)
  - Examples of BCU String Configurations:
    - If 60 cells per string, then the max is 10 strings (60 x 10 = 600)
    - If 4 batteries per string, then the max is 16 strings (4 x 16 = 64)
    - If 24 cells per string, then the max is 16 strings (24 x 16 = 384)
    - If 240 cells per string, then the max is 2 strings (240 x 2 = 480)
- Network communications
- DNP3 Communications
- Embedded Internal Web Server
- Field upgradable software
- Two ambient temperature sensors
- String voltage capture (Sum of Batteries)
- Discharge data collection and reporting
- Remote network configuration
- Field hardware commissioning
- External Alarm Dry Contacts – Utilized with ELS System
- Capture string and battery data, reports to CELLTRAQ™ Battery Management Software at scheduled frequency

# SPECIFICATIONS

## WIRELESS BATTERY SENSOR

Component	Specification
Wireless RF Radio Band	802.15.4 compliant; 2.4 GHz @ 8 mW (6.3 dBm)
Batteries per St Wireless RF Range ring	0 - 30 m
Operating Temperature	0° C - 65° C
Storage Temperature	-10° C - 80° C
Test Current Draw	1100 – 4500 mA depending on Battery Float Voltage
Regulatory Compliance	FCC, CE, RoHS, IEEE
Voltage Resolution	1 mV
Physical Dimensions	2.63 in L, 2.64 in W, 1.06 in H

### Capabilities

- One sensor per cell/jar
- 2V, 6V, 8V, 12V
- Sensors capture voltage, temperature, & conductance
- Strap Resistance monitoring
- Mesh routing communication
- Quick, fully hot swappable sensor and/or wiring harness
- Field upgradable firmware
- Compatible with VRLA and VLA batteries
- Patented conductance technology
- Non-Invasive to the battery
- Accurate battery state-of-health results
- Wireless system, minimizes wiring, installation costs & maintenance

Model	VOLTAGE		CONDUCTANCE		TEMP @ NEGATIVE POST		RESISTANCE		IDLE CURRENT
	Measured Range (VDC)	Accuracy (mV)	Meas. Range Per Cell	Accuracy	Measured Range (C°)	Accuracy	Measured Range	Accuracy	Measured Range
CGS3-02V M(XX)	1.75 - 2.50	+/- 20	100 - 15,000	+/- 3%	-10 to +65	+/- 2°C	N/A	N/A	70 - 80mA
CGS3-12V M(XX)	10.50 - 15.0	+/- 20	100 - 4,200	+/- 3%	-10 to +65	+/- 2°C	N/A	N/A	50 - 60mA
CGS3-100-2V	1.75 - 2.50	+/- 20	100 - 15,000	+/- 3%	-10 to +65	+/- 2°C	2 - 1,000 $\mu\Omega$	+/- 20 $\mu\Omega$	70 - 80mA
CGS3-100-06V-12V	6.50 - 14.50	+/- 20	100 - 4,200	+/- 3%	-10 to +65	+/- 2°C	2 - 1,000 $\mu\Omega$	+/- 20 $\mu\Omega$	50 - 60mA

# SPECIFICATIONS

## VOLTAGE, TEMPERATURE, CURRENT (VTC) UNIT

Component	Specification
Wireless RF Radio Band	802.15.4 compliant; 2.4 GHz @ 8 mW (6.3 dBm)
Operating Temperature	0° C - 65° C
Storage Temperature	-10° C - 80° C
Regulatory Compliance	FCC, CE, RoHS, IEEE
Physical Dimensions	L:4.00 in, W:2.50 in, H:1.09 in
Wireless RF range	0 - 30 m
Resolution	1 A

### Capabilities

- String current & ripple current monitoring
- Measurements include voltage, current, ripple current, and temperature
- Compatible with battery string configurations commonly found in telecommunications, power utility, and UPS applications between 18-480VDC nominal
- Powered by the battery string, eliminating the need for an external power source

## MEASUREMENT & ACCURACY

Model	Voltage Input	Accuracy	Current Range	Accuracy of Current Input	Discharge Current	Ripple Current Accuracy
CGVTC2-60	20 - 70 VDC	+/- 3%	5 - 200 A	+/- 3% +/- 2A	-5 - -400 A	3%
CGVTC2-300	90 - 300 VDC	+/- 3%	5 - 200 A	+/- 3% +/- 2A	-5 - -400 A	3%
CGVTC2-600	300 - 600 VDC	+/- 3%	5 - 200 A	+/- 3% +/- 2A	-5 - -400 A	3%

## BCU AC WALL WART POWER ADAPTER

Component	Specification
Input Voltage Rating	100 - 240 Vac, 50 - 60 Hz
Output Voltage	9 Vdc
Output Current	0.8 A
No Load Power (stand by)	<100 mW
Power Efficiency	>80.01%
Temperature Range	0 to +40° C at full load
ETL	60950 1
EMI standard	FCC part 15 class B

### Capabilities

- Over voltage and short circuit protected

# SPECIFICATIONS

## TELCO DC-DC CONVERTER

Component	Specification
Input Voltage Range	24 - 65 Vdc
Output Voltage	12 Vdc +/-1% Load Regulation
Output Power	10 Watts Max
Isolation Voltage	Input to output for 1 minute 1500 Vac
Power Efficiency	86% Typical
Temperature Range	-40 to 85° C
Safety and Protections	Fused String Power Cable assembly
Dimensions	3.972 in L x .876 in H x 0.6 in W

## UTILITY/UPS DC-DC CONVERTER

Component	Specification
Input Voltage Range	100~1000 Vdc
Output Voltage	12 Vdc
Output Power	10 Watts Max
Power Efficiency	77% Typical
Isolation Voltage	Input to output for 1 minute 4000 Vac
Operating Temperature	-40 to 70° C
Safety and Protections	Fused String Power Cable assembly
Dimensions	3.783 in L x 2.126 in H x 1.441 in W

## SOLID CORE CURRENT TRANSDUCER

Solid-Core Closed Loop Hall Effect current sensor.

Component	Specification
Overall accuracy at 25C	0.5%
Primary through hole	1.57 in (40 mm) diameter

## SPLIT CORE CURRENT TRANSDUCER

Split-Core Closed loop Hall Effect current sensor.

Component	Specification
Overall accuracy at 25C	2.5%
Primary through hole	4.09 in x 1.57 in (104 mm x 40 mm)

# ORDERING INFORMATION

## BASE COORDINATOR UNIT (with STRAP RESISTANCE)

Typical of Utility Applications



Model	Description
<a href="#"><u>CGBC-350</u></a>	CELLGUARD™ Wireless Base Coordinator Unit with Webserver And Modbus

Note: 1x for up to 10 strings, open racks same room. Or 1x Per enclosed cabinet needed.

## SENSORS WITH STRAP RESISTANCE



Model	Description
<a href="#"><u>CGS3-100-02V</u></a>	CELLGUARD™ Wireless Sensor, 2 Volt
<a href="#"><u>CGS3-100-06V-12V</u></a>	CELLGUARD™ Wireless Sensor, 6-12 Volt

Note: 1x per jar/cell, includes (1) sensor, (1) wire harness (2) 4-tabbed terminals.

## BASE COORDINATOR UNIT (without STRAP RESISTANCE)

Typical of Telecommunications Applications



Model	Description
<a href="#"><u>CGBC-350</u></a>	CELLGUARD™ Wireless Base Coordinator Unit with Webserver And Modbus

Note: For CGBC-350 1x for up to 16 strings, open racks same room. Or, 1 per enclosed cabinet is needed.

## SENSORS WITHOUT STRAP RESISTANCE



Model	Description
CGS3-02V M6	CELLGUARD™ Wireless Sensor, 2 Volt, M6 terminals
CGS3-02V M8	CELLGUARD™ Wireless Sensor, 2 Volt, M8 terminals
CGS3-02V M10	CELLGUARD™ Wireless Sensor, 2 Volt, M10 terminals
<a href="#"><u>CGS3-12V M6</u></a>	CELLGUARD™ Wireless Sensor, 12 Volt, M6 terminals
CGS3-12V M8	CELLGUARD™ Wireless Sensor, 12 Volt, M8 terminals
CGS3-12V M10	CELLGUARD™ Wireless Sensor, 12 Volt, M10 terminals

Note: 1x per jar/cell, includes(1) sensor, (1) wire harness (2) 2-tabbed terminals.



# ORDERING INFORMATION

## CELLGUARD™ WIRELESS SYSTEM ACCESSORIES



### Power Supply

Model	Description
C103	AC Wall Wart Power Adapter
CGBC-DC-1000	DC-DC Converter, Input (120 V - 1000 V)
<a href="#">CGBC-DC 48</a>	DC-DC Converter (24 V - 72 V)

Note: 1x per BCU.

## STRING VOLTAGE, TEMPERATURE, & CURRENT MEASUREMENT



Model	Description
<a href="#">CGVTC2-60 LCT</a>	Volt/Temp/Current 18-72V LCT Split Core Transducer 750 MCM Cables Or Larger
CGVTC2-300 LCT	Volt/Temp/Current 90-300V LCT Split Core Transducer 750 MCM Cables Or Larger
CGVTC2-600 LCT	Volt/Temp/Current 300-600 V LCT Split Core Transducer 750 MCM Cables Or Larger



Model	Description
CGVTC2-60	Volt/Temp/Current 18-72V LCT Split Core Transducer 500 MCM Cables Or Smaller
CGVTC2-300	Volt/Temp/Current 90-300V LCT Split Core Transducer 750 MCM Cables Or Larger
CGVTC2-600	Volt/Temp/Current 300-600 V LCT Split Core Transducer 500 MCM Cables Or Smaller